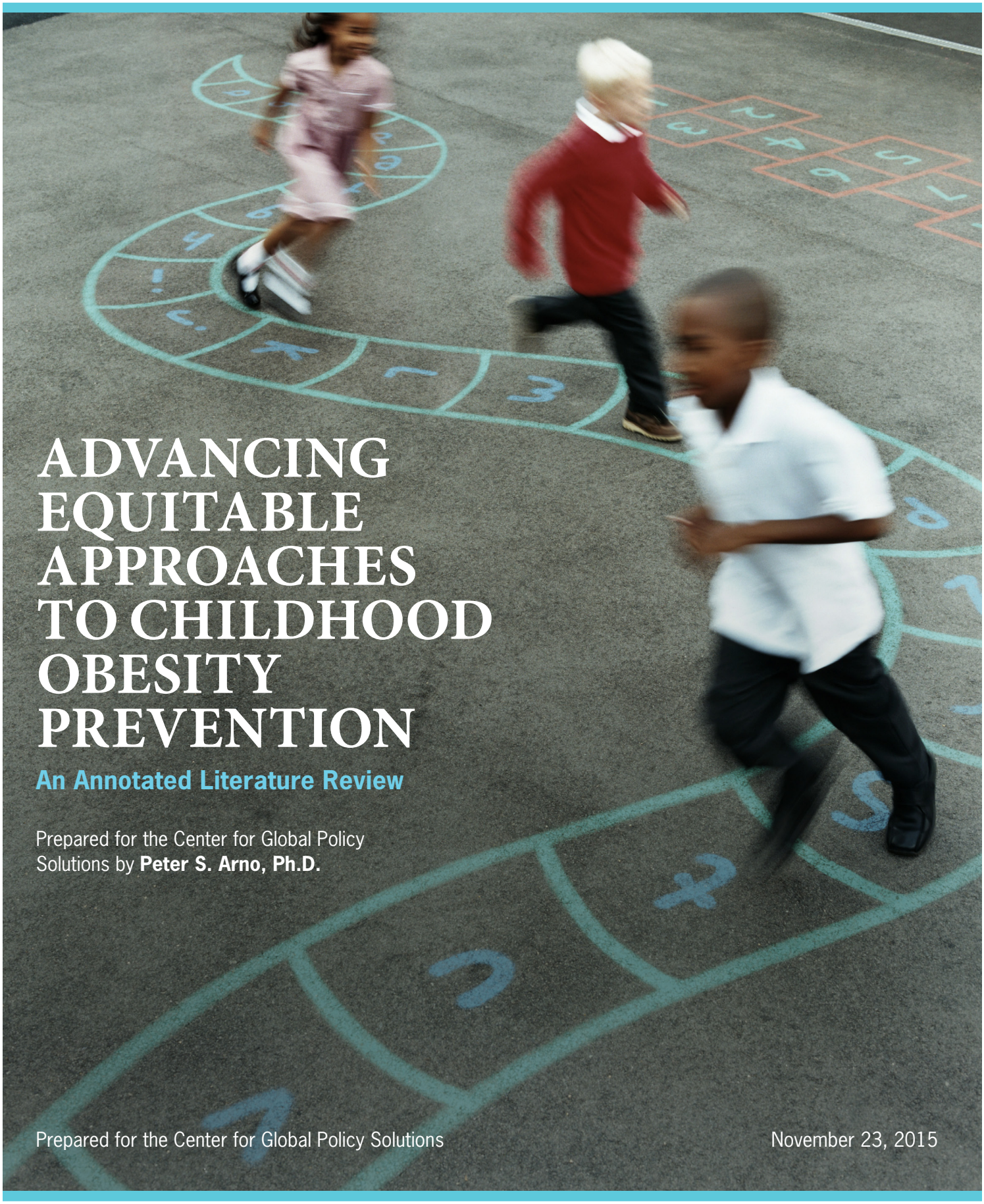
CGPS | Center for Global Policy Solutions



ADVANCING EQUITABLE APPROACHES TO CHILDHOOD OBESITY PREVENTION

An Annotated Literature Review

Prepared for the Center for Global Policy Solutions by **Peter S. Arno, Ph.D.**

Prepared for the Center for Global Policy Solutions

November 23, 2015

Author

Peter S. Arno, Ph.D.

Senior Fellow and Director of Health Policy Research, Political Economy Research Institute

University of Massachusetts-Amherst

Distinguished Fellow, CUNY Institute for Health Equity, City University of New York, Lehman College

Additional research assistance provided by **Katherine Greenblatt, B.A.**

This report was commissioned by and prepared for the Center for Global Policy Solutions with support from the Robert Wood Johnson Foundation.

The Center for Global Policy Solutions is a 501(c)(3) think tank and action organization that labors in pursuit of a vibrant, diverse, and inclusive world in which everyone has the opportunity to thrive in safe and sustainable environments.

Learn more at www.globalpolicysolutions.org

Table of Contents

Executive Summary

The latest epidemiological data suggest that the incidence of obesity among children may have stabilized, although at a dangerously high level. There are currently about 13 million obese children and adolescents in the US. Moreover, significant racial/ethnic and socioeconomic disparities exist and may be widening. This report consists of an expansive, annotated literature review in two broad sections—(1) intervention studies geared at preventing childhood obesity and (2) studies that examine some of the social determinants of health underlying the epidemic.

Intervention Studies

The evidence on intervention studies designed to prevent or reduce childhood obesity suggests that the most successful strategies incorporate a long-term, multipronged community-based approach, targeting younger children. It is crucial that schools play a key role in this partnership in terms of providing opportunities for healthier nutrition and physical activity and that there is parental involvement and support from the community.

A related approach, which has garnered considerable attention among researchers, involves applying a systems science framework in which sophisticated modeling is utilized to characterize the complex interactions and feedback loops across social, environmental and organizational systems. Research on the efficacy of this approach, however, is only just emerging. The least developed area is at the distal end of the model used in the systems science framework—the political economy of the system itself. By this we mean the ways in which the macroeconomic and political forces that shape and develop the institutions, policies, and programs affect the incidence, prevalence, and prevention of obesity.

School-based interventions alone are inadequate, largely because they do not account for child behavior outside of school, require sustained staff resources and training, and have little impact on addressing obesogenic features in the community. It is worth highlighting the US Department of Agriculture's Fresh Fruit and Vegetable program, which targets low-income schools and provides funding for distribution of free fresh fruits and vegetables. Preliminary studies have found promising evidence that this approach can reduce obesity rates in participating schools. Follow-up studies are needed to confirm these findings.

Studies focused on early childhood interventions have mainly been implemented in children five and younger and conducted in childcare facilities. There is certainly some logic to focusing on young children whose health behaviors are still developing, but the evidence from these studies is decidedly mixed and may be affected by the implementation of effective regulations that prescribe adequate physical activity and nutritional standards.

Technology-related interventions take advantage of platforms such as computer programs, video games, Internet sites, and apps for mobile devices to target health behavior outcomes such as diet quality, physical activity levels, and sedentary time. Unfortunately, the studies to date have been of short duration and poor quality, resulting in disappointing results. However, this is a rapidly emerging field and may hold some promise in the years ahead.

Interventions brought about by laws or policies have significant potential for positive change in health behaviors and weight outcomes, not only for children across the socioeconomic spectrum, but also for people of all ages in the population as a whole. These interventions include local or organizational policies and practices as well as large-scale government regulations and programs. Much of the research in this area focuses on food and beverage prices, subsidies, and

taxes, as well as the built environment, housing, and economic policy. The majority of studies have applied sophisticated modeling techniques; true experimental designs are rare in this area. Studies have, for example, demonstrated efficacy, and occasionally cost-effectiveness, in reducing child obesity by improving early childcare standards, eliminating tax subsidies for television advertising of unhealthy food directed at children, subsidies for fruit and vegetable consumption, imposing a sugar-sweetened beverage (SSB) tax, and increasing active physical education time in schools.

Modeling studies, however, have limitations, most obviously their practical application in the real world. They also suffer from some of the mundane problems facing the other intervention studies including the failure to adequately capture the multitude of mediating or moderating factors that may influence the relationships between specific policies and child weight. Despite these caveats, there are at least four reasons why these types of approaches should be considered and pursued more seriously: (1) They are built on a reasonably strong evidence base (e.g. studies linking prices or advertising exposure to consumption); (2) the predicted effect size on obesity reduction is substantial (and larger than most of the intervention studies discussed earlier); (3) they have the potential to reach large segments of the population, particularly poor and minority communities; and (4) because of their modest cost, and in some cases, cost savings, they are more likely to be sustainable over the long term.

Social Determinants of Health

The social determinants of health broadly speaking include the social, cultural, and economic conditions that provide the framework for policies that shape the conditions under which people live. We felt it important to examine some of these conditions, such as poverty, income, housing, and the power of the industrial food system, because they shape people's lives in many ways, iincluding influencing their patterns of food consumption and physical activity. Moreover, mainstream researchers and policymakers have devoted inadequate attention to these underlying conditions, which may play an important role in curbing the obesity epidemic.

Systematic data reviews have examined the relationship between local food environments and childhood obesity and found little evidence linking the two. Reviews analyzing the relationship between the built environment, physical activity, and obesity— although somewhat mixed—do show an overall modestly beneficial effect. It is well understood that ultimately obesity is a function of energy balance between calories expended through physical activity and calories taken in through food and beverage consumption. It therefore makes sense that some studies in both of these fields of inquiry demonstrate beneficial findings. However, beyond the problem of the weak study designs that characterize many of these studies (most studies are cross-sectional and observational, which prevents strong inferences of causality), the inconsistency of study findings suggests that the overall focus of these inquiries overemphasizes the proximal causes of obesity at the expense of the more distal ones. In other words, there has been a lack of attention to the political, economic, and social conditions that shape the environment and the population-based behaviors that generate obesity.

Over the past decade, the obesity field has been dominated by the use of a behavioral framework in which the individual is the primary unit of analysis and intervention. Although social and cultural factors are often considered, they are generally not the central focus. This has begun to change modestly as studies have started addressing the role of the physical, social, and economic context of neighborhoods where people live. However, researchers have not yet given as much attention to the underlying context or to policies that generate these conditions and constrain people's choices. While building bike paths and pedestrian walkways, improving access to parks and recreational facilities, or improving access to supermarkets, are amenities any community might favor, they are unlikely to curb the obesity epidemic without addressing the underlying social determinants of health.

Social epidemiology has energized research on health and place by demonstrating a strong social gradient that exists in health status in general and is starkly visible in the obesity epidemic. However, this has yet to be fully embraced by the mainstream in obesity research or by funders or policymakers. Poverty, income, neighborhood deprivation, inadequate housing, residential segregation, and the political economy of our industrial food system lie at the heart of the epidemic and are key to understanding the disproportionate burden of child obesity on poor and vulnerable populations.

Inclusion Criteria

Our review of intervention studies reports outcomes in terms of anthropometric measures of obesity or other health behavior outcomes such as diet quality, physical activity levels, or sedentary behavior levels. The main search included articles published between January 2010 and October 2015. The literature on the social determinants of obesity begins in 2000. Studies were gathered through systematic searches of electronic databases such as PubMed, as well as reference lists of relevant articles, independent searches, and websites from relevant organizations. Titles and abstracts were screened by two independent reviewers. Full copies of the relevant articles were retrieved and assessed independently for eligibility. Preference was given to (1) interventions that targeted children from minority groups or low-income families; (2) articles that reported results separately for these subgroups; and (3) articles that examined whether interventions increased or decreased disparities between these groups and their peers. To produce a comprehensive assessment, we also included strategies that would affect children across the socioeconomic gradient. Included articles were published in English, with no limits placed on setting or country. Both measured and self-reported outcomes were included. No limits were placed on study design but preference was given to systematic reviews. Included articles examined children from birth to 18 years of age; articles that included adults in the study sample were also used if results for children were reported separately.

We relied more heavily on systematic data reviews (SDRs) when they were available because, in general, they produce a less biased picture of the literature in a given field than individual studies. However, it was not always possible to find an SDR on each specific topic. Additionally, there is often a lengthy time lag between publication or pre-publication of individual studies and the publication of a review, and with the quickly evolving literature on obesity, many of the most recent studies are not included. Moreover, there are other limitations to reviews that must be considered, including that the results of many reviews are often provisional and may be overturned by a single large or robust study. In this report, the SDRs dominate our review of intervention studies but are less prevalent in the studies focused on the social determinants of health.

Abbreviations

ATLAS Active Teen Leaders Avoiding Screen-Time

BMI Body mass index

BPC CATCH BP and Community

CAFTA DR Dominican Republic-Central America Free Trade Agreement

CATCH BP (or BP) Coordinated Approach to Child Health BasicPlus

CDC Center for Disease Control and Prevention

CF&B Competitive food and beverage

CFBAIR Children's Food and Beverage Advertising Initiative

CI Confidence interval

CV Cardiovascular

DID Difference-in-differences

DPHO District Public Health Office

ECE Early care and education

EMI Ecological momentary intervention

FFVP Fresh fruit and vegetable program

FV Fruit and vegetable

GuS Growing Up Strong Program

HIP Healthy Incentives Program

HOPS Healthier Options for Public Schoolchildren

HUD Department of Housing and Urban Development

IOM Institute of Medicine

MSA Metropolitan Statistical Area

MTO Moving to Oppurtunity

MVPA Moderate to vigorous physical activity

N Sample size

NAFTA North American Free Trade Agreement

NR Not reported

NYS New York State

NYC New York City

OWG OrganWise Guys

PA Physical activity

PE Physical education

RCT Randomized controlled trial

SD Standard deviation

SE Socioeconomic

SEP Socioeconomic position

SES Socioeconomic status

SNAP Supplemental Nutrition Assistance Program

SDR Systematic Data Review

SR Systematic review

SSB Sugar-sweetened beverage

TV Television

TV AD Television advertising

UK United Kingdom

US United States

USDA United States Department of Agriculture

WIC Special Supplemental Nutrition Program for Women, Infants, and Children

WHO World Health Organization

WOC Whole-of-community

Intervention Studies

The following is a summary of the types of interventions detailed in the enclosed table (see Appendix).

School-Based Interventions

- The majority of these interventions incorporate both physical activity and nutrition components and show higher efficacy when targeting multiple behaviors and environments is those with longer duration.
- Similar strategies seem to be successful in minority and low-income children, as well as appropriate cultural tailoring of intervention components.

The vast majority of childhood obesity intervention studies are school-based. They are implemented in school or after-school settings, sometimes include other components including family involvement, and usually focus on the school food environment, physical education, and nutrition education. We have included 12 SDRs conducted since 2011 in which the primary question revolved around the efficacy of a school-based intervention. Overall, these reviews show that some modest gains in reducing obesity can be made in the school context, a setting that provides the opportunity to reach a large, diverse population of children. The most effective studies appear to be those aiming to modify multiple health behaviors across a variety of school environments, with community and family involvement playing integral roles in these strategies. Intervention duration is important in achieving reductions in anthropometric measures and may help to improve sustainability. Many reviews found larger positive changes in measurements of health behaviors such as diet quality and physical activity time than in weight outcomes such as BMI or BMI z-scores.

Several SDRs examined the effects of school-based interventions on minority children and those from low-income families. Robinson et al. found multicomponent strategies involving several school settings to have the most success with African American children.[1] Another review by Holub and colleagues that focused on Latino children found promising results for the same strategies, as well as for the cultural tailoring of interventions to targeted subgroups.[2] Two additional reviews focused on the efficacy of school-based interventions specifically in minorities reached similar conclusions regarding the importance of multiple school environments, community and family involvement, and cultural sensitivity.[3, 4]

There have been some recent studies that show promise but have not been included in the latest published SDRs. For example, the analysis by Qian and colleagues of the USDA's Fresh Fruit and Vegetable Program, which targets low-income schools and provides funding for distribution of free fresh fruits and vegetables, found a 3% decrease in obesity rates for participating schools and a 1.8% reduction in overweight rate.[5] Sanchez-Vaznaugh et al. found evidence that school competitive food and beverage (CF&B) policies (which restrict the sale of foods such as soda, candy, and chips and are called competitive foods and beverages because they are available alongside and compete with school meal programs) have a positive effect on overweight/obesity trends. However, the improvements were much smaller in children from low-income neighborhoods.[6] These results highlight the importance of separating and examining study results by subpopulation to determine equity.

A few limitations are common to most of the school-based intervention reviews and studies, including an inability in many cases to account for children's behaviors during time spent out of school, a lack of long-term intervention evaluation or follow-up, and a scarcity of studies with stratified outcomes to compare effects in different subgroups of the population. A nearly universal problem is the heterogeneity of included studies. Heterogeneity is used here to describe differences in study design, population, outcomes measures, and other variables that make it

difficult for many of the SDRs to make direct comparisons in intervention effectiveness or to perform meta-analyses.

Community-Based Interventions

- Higher efficacy is found when interventions target younger children, are longer in duration, and include multiple settings, but overall results in this area are mixed.
- Community-based interventions are unlikely to increase socioeconomic inequalities and have been shown to reduce disparities in some cases.

Community-wide interventions are promising in their broad reach, often encompassing multiple settings and engaging in numerous strategies to improve population health. Whole-of-community (WOC) interventions are designed to improve population weight status by targeting a specific area such as a town, village, or city with programs, policies, or environments that are conducive to obesity prevention. We have included four SDRs conducted since 2013 that evaluate WOC strategies. These interventions achieved varied levels of success in reducing adiposity measures (which include different ways to assess obesity, e.g. body mass index (BMI) or changes in BMI (BMI-z scores)). The most successful interventions tend to be longer in duration, target younger children (middle school or primary school), and include multiple settings both within the community. A review by Bleich et al. found that four of the nine studies examined achieved desirable changes in BMI or BMI z-scores,[7] while another review found improvement for at least one adiposity measure in seven of eight studies (meta-analysis of six trials found a mean difference in intervention participant BMI z-scores of -0.09 (CI from -0.16 to -0.02)).[8] Baker and colleagues examined community strategies that targeted physical activity in both children and adults but found no effects.[9]

One review by Boelsen-Robinson et al. examined the effectiveness of WOC interventions by socioeconomic status (SES) in order to identify characteristics likely to have an equitable effect on obesity prevalence.[10] Nine of ten WOC interventions included were found to be equally or more effective in lower SES groups, with positive changes in weight outcomes for children. The review concluded that WOC interventions are not only unlikely to increase socioeconomic (SE) inequalities in population weight but when designed specifically with disadvantaged communities in mind, have been shown to be effective in reducing disparities in weight outcomes. It is noted by the authors, however, that these types of interventions alone will not be sufficient to address the socioeconomic gradient in weight.

These reviews found the following limitations: selection bias of the included intervention communities, suboptimal study designs in some cases, a lack of studies that stratified results by socioeconomic status, and heterogeneity in these measures. As Wolfenden et

al. stated, "The lack of trials and the limited diversity of community intervention approaches hinder an examination of specific features of interventions, which may have contributed to positive intervention effects."[11]

Technology-Based Interventions

- These interventions show potential to engage children and target health behavior outcomes utilizing various platforms.
- Technology interventions have not been studied extensively; there are few high-quality studies of longer duration; and any positive outcomes tend to be short-lived.

The benefits of employing new technologies in childhood obesity interventions are promising, but the field is just emerging. Electronic interventions take advantage of platforms such as computer programs, video games, Internet sites, and apps for mobile devices to target health behavior outcomes such as diet quality, physical activity levels, and sedentary time. We have included three SDRs on technology-related interventions published since 2011. Numerous studies were able to demonstrate positive effects on health behaviors and/or showed decreases in adiposity measures, but any positive effects tend to be short-lived. Overall, it is difficult to determine the efficacy of these interventions due to a paucity of high quality, long-term studies thus far. Whittemore and colleagues compared school-based Internet programs targeting obesity prevention for adolescents and found positive dietary or physical activity outcomes in 10 of 12 included studies. However, only one study detected a significant decrease in BMI.[12] Another review, Nguyen et al., compared electronic media interventions.[13] Of the 24 included studies, six were stand-alone electronic interventions that demonstrated significant obesity reduction. The rest of the included studies did not separate effects of the electronic intervention from other intervention components such as school or community-based strategies. Another review examined the use of "Exergaming," a combination of interactive video games and physical exercise as a tool to decrease childhood obesity.[14] Although these games have the potential to increase physical activity and reduce sedentary behavior, no rigorous attempt was made to evaluate their efficacy.

We included several additional studies that focus on the effectiveness of technology-based interventions in minority or low-SES populations. One study tested a mobile application that was found to slightly increase fruit and vegetable (FV) intake (+0.88 servings/day) and make a small decrease (-0.33 servings/day) in sugar-sweetened beverage (SSB) consumption in minority girls.[15] However, these differences were not statistically significant in comparison with the control group and no significant differences were observed in BMI. Another study included a smartphone application and website in an obesity prevention intervention for adolescent boys recruited from schools in low-income communities, but no significant effects were found on body composition.[16]

The main limitation in this area is a lack of relevant studies or studies with longer durations or follow-up. Many interventions are very brief with limited sustainability, small sample sizes, and targeted samples that may result in a lack of generalizability. Heterogeneity in intervention designs, outcomes, and components make comparison difficult, especially since few report BMI changes.

Policy Interventions

- Policies affecting food and beverage prices have been shown to influence both purchasing and consumption but to what extent remains uncertain.
- Due to the nature of these interventions, many studies employ modeling techniques with promising results.
- Subsidies for fresh fruits and vegetables as well as a tax on sugar-sweetened beverages may be particularly effective in low-income or minority populations.

Interventions brought about by a law or policy change hold significant potential for positive effects on health behaviors and weight outcomes, not only for children across the socioeconomic spectrum but for the population as a whole. These interventions include local or organizational policies and practices as well as large-scale government regulations and programs. Our search included five SDRs published since 2011. Much of this research focuses on food and beverage prices, subsidies, and taxes, as well as the built environment, housing policy, and other factors. Reviews evaluating prices, subsidies, and taxes establish that they affect levels of purchasing and consumption of target products, but to what extent remains unclear. A review by Faulkner and colleagues evaluated 38 studies and seven SDRs and found weight outcomes consistently responsive to food and beverage prices.[17] Thow et al. reported that subsidies for healthy foods led to an increase in their consumption (although the effect on total caloric intake is unclear) and that SSB taxes can reduce consumption, but only in proportion to the taxes applied.[18] Thow also notes that some studies find taxes to be a bigger burden for low-income families.

Several studies predicted the effects of policy interventions using modeling techniques. Kristensen et al. applied microsimulation modeling to estimate the effects of specific policies 20 years after implementation.[19] They found that after-school PA programs could potentially reduce obesity among children ages 6-12 by 1.8 percentage points, while a SSB excise tax of $0.01/ounce could reduce obesity among adolescents ages 13-18 by 2.4 percentage points. Gortmaker and colleagues used modeling to analyze cost-effectiveness in addition to potential obesity reduction, drawing on four studies that each estimate possible 10-year policy costs and effects in cohort models.[20] Their analyses indicate that a SSB tax could reduce BMI up to 0.16 units per child, while policies

improving early childcare standards, eliminating tax subsidies for TV advertising of unhealthy food directed at children, and increasing physical activity time in schools would all reduce BMI, but to a lesser extent (BMI reductions range from .02 to .028 units per person). For three of the four policies, there would be a potential net cost savings over the 10-year period; additionally, either imposing a SSB tax or eliminating tax subsidies would generate net tax revenue.

Several studies and systematic reviews examined the efficacy of laws and policies specifically in low-income and minority populations. Powell et al. suggest that subsidies for fresh fruits and vegetables are especially effective in reducing weight among low-income youth[21] and Faulkner et al. found FV subsidies and the SSB tax to be particularly promising for children and low-income households.[17] Weight outcomes of participation in food assistance programs were mixed: one study found no improvement after WIC changes meant to improve dietary intake and feeding practices among toddlers and infants,[22] while another found that subsidized meals were beneficial for children's weight. However, in cities with high food prices (where benefits have the least purchasing power) food assistance may actually contribute to childhood obesity.[23] Two studies that examined housing mobility and child health found that housing mobility (using housing vouchers to move to higher income neighborhoods) reduced obesity among adults but had little impact on child health or BMI and in some cases worsened health in the treatment group.[24,25]

An obvious limitation in this area is the difficulty of studying the effects of laws or policies without implementation on a large scale or for an extended period of time. Many of the interventions studied may need longer durations to show effects. Modeling studies often have limited data with which to predict direct associations between policy and BMI. Other limitations include the scarcity of policy studies that directly assess influence on BMI or weight and the multitude of other factors that may influence the relationships between specific policies and child weight.

Early Childhood Interventions

- The majority of these interventions are carried out in childcare facilities; outcomes are mixed but do identify areas for improvement.
- There is a higher efficacy when both nutrition and physical activity components are included, as well as the addition of cultural tailoring for ethnic minority children.

Interventions focusing on obesity treatment or prevention in early childhood target children at an age when health behaviors are still developing. These interventions have the opportunity to establish patterns that will affect health risks over the course of their lives. Implemented in children five and under, the majority of studies focus on strategies carried out in childcare facilities. Our search included five reviews in this area published since 2011. Findings are mixed, identifying several important areas for improvement that are likely to positively influence child weight and health behaviors. Zhou et al. compared interventions taking place in childcare settings—only seven out of 15 studies showed relative improvements in adiposity, but all seven employed both physical activity and nutrition components, supporting the notion that interventions are more effective when multiple strategies are used in combination.[26] Bond and colleagues examined both weight outcomes and cost-effectiveness of interventions for children under five.[27] Of the four randomized control trials (RCTs) which met inclusion criteria, only one (the African American subgroup of Hip-Hop Jr.) showed a significant improvement in weight measures with a 24-month BMI increase in the intervention group of 0.48 kg/m2 versus a 1.14 kg/m2 increase in the control group. Larson et al. found a lack of strong state regulations in childcare settings, with opportunities for improvement in food nutritional quality and amount of quality physical activity time.[28]

Additional studies assessed the effects of early

childhood interventions on low-income children or those belonging to racial/ethnic minorities. Many reviews also examined interventions directed toward this population, or at least compared effectiveness in these children versus their peers. Bender & Clark analyzed the effects of cultural adaptations on study outcomes in US ethnic minority preschool children and found a relative absence of appropriately adapted interventions.[29] However, when employed, these types of modifications were found to have potential to enhance intervention effectiveness. Laws et al. examined early childhood interventions targeting children from socioeconomically disadvantaged or indigenous families.[30] Mean differences in BMI between intervention and control groups ranged from -0.29 kg/m^2 to -0.54 kg/m^2. Interventions had greater impact when initiated in infancy than those started in preschool (ages 3-5). Sekhobo et al. examined obesity prevalence in low-income children in relation to the enactment of new regulations in New York City licensed childcare centers.[31] Average annual change in obesity prevalence was -2.6% for high-risk neighborhoods versus -1.6% in low-risk neighborhoods and results suggest a narrowing of the gap in obesity prevalence. Another study found that enrollment of low-income children in Head Start resulted in a significant decline in mean BMI z-score at a rate of -0.82 units by the end of the second year of enrollment.[32]

Common limitations in this area include a need for longer intervention duration and extended follow-up periods. There is a lack of studies examining long-term efficacy, as well as those that compare results based on socioeconomic status. Bond et al. sought to review the cost-effectiveness of early childhood interventions and were unable to find any studies that fit inclusion criteria.[27]

Comparing Multiple Interventions

- Interventions achieve more positive outcomes when multiple settings and levels, and both nutrition and physical activity are targeted. Intervention duration and the inclusion of home or family components also improve efficacy.
- Reviews focusing on reducing disparities in child obesity found that interventions did not increase inequalities and may reduce them in some cases.
- Higher-level interventions, such as those targeting policy and environmental or economic factors, have the most potential to reduce inequalities.

Many reviews attempt to compare multiple types of interventions to determine which are most effective or what components are common to those with positive outcomes. Our search included 12 such

reviews published since 2010. Most concluded that efficacy is increased in multi-setting and/or multi-level interventions, in those that influence both diet and PA, in interventions with longer durations, and in those that include a parental or home component. Several reviews performed meta-analyses. Peirson et al. could not identify any particular intervention strategy with consistent benefits, but overall found a small, significant reduction in BMI (-0.09 kg/m^2, 95% CI) in an analysis of 90 studies in mixed-weight populations.[33] Wang et al. compared data from 147 articles, finding stronger evidence to support the efficacy of school-based interventions than interventions in childcare or home settings.[34] Meta-analysis found a small overall effect size, with an improvement in z-score of about 0.05 and in BMI of about 0.25. The meta-analysis performed by Waters et al. and published by the Cochrane Collaborative included 55 international studies, finding an overall mean difference in adiposity of -0.15 kg/m^2, a small shift that could prove important if sustained over time.[35] Two reviews found higher success rates when interventions were initiated in younger children; one documented better results when interventions were introduced at middle school age or younger[36] and another reported stronger effects in children ages 6-12.[35]

The 12 reviews in this category include seven that specifically focus on targeting minority and low-income children or evaluate how interventions can reduce disparities in child obesity. Although most reviews were unable to identify specific strategies to reduce inequalities, two concluded that child obesity interventions did not increase inequalities and sometimes reduced or slowed the widening of disparities.[37,38] McGill et al. examined the differential impact of healthy eating interventions by socioeconomic position.[39] This review, drawing upon evidence from all age groups, found upstream "price" interventions (such as taxes, subsidies, or economic incentives) to be the most likely to decrease inequalities in healthy eating outcomes. However, downstream "person" interventions (individual-based information and education) had the greatest potential to increase inequalities as these interventions have more benefits among higher income groups. Similarly, Beauchamp et al. (in a study that included adults as well as children) found community-based interventions or policies aimed at structural changes to the environment to be more effective in lower socioeconomic groups, while information provision was ineffective.[40] In children, Bambra et al. found school-delivered and environmental interventions to have the greatest potential influence on child obesity rates in disadvantaged areas.[37] The importance of cultural competence in intervention design and delivery is highlighted by Suarez-Balcazar et al., who found specific strategies that tend to work well for Latino and African American children.[41]

One limitation of these reviews is that the majority of studies take place in the school setting, making an unbiased comparison with other intervention settings more difficult. Another common difficulty is in specifying what particular intervention components produced positive results. Other limitations include heterogeneity of studies, lack of detailed subgroup analysis (gender, age, socioeconomic status, etc.), lack of studies that examine cost-effectiveness, publication bias, and weak study designs.

System Science Approach

- This approach evaluates the complex interactions across the various systems affecting child obesity utilizing modeling techniques.
- The Healthy Kids, Healthy Community Project, as well as the ongoing Childhood Obesity Research Demonstration project, apply this emerging technique to the study of child obesity.

Due to the complexity and multi-faceted causes of the obesity epidemic, a systems science approach has gained traction as a way to address the issue. This framework utilizes sophisticated modeling to characterize the complex interactions and feedback

loops across social, environmental and organizational systems. The Institute of Medicine[42,43] along with a number of individual investigators[44–51] has attempted to conceptualize its applicability to evaluating obesity prevention interventions. However, research on the efficacy of this approach is only just emerging. Most of the analyses conducted to date have not included hard outcome measures such as population measures of overweight or obesity. As James Sallis recently wrote, "Building systems models of childhood obesity with quantitative data has not been accomplished to my knowledge, so the application of systems thinking is in its early development in this field."[52]

The most ambitious attempt to apply a system science approach to obesity has been the Robert Wood Johnson-funded Healthy Kids, Healthy Community (HKHC) project. However, its evaluation of projects in 49 communities across the country was "process oriented, monitoring community partnerships' progress on their work plans, community engagement, revenue generation, and changes made to local and organizational policies and environments. Thus, the evaluation did not focus on changes in individual behaviors and health outcomes."[53] A fuller description of these projects can be found in a special supplement of the *Journal of Public Health Management* published in May, 2015.[54]

Another ambitious project that is currently underway and may fall under the system science framework is known as the Childhood Obesity Research Demonstration Project (CORD).[55] It is funded by the CDC with moneys from the Affordable Care Act and will conduct multisite and multisector interventions in health care centers, schools, early care and education centers, communities, and the home in six rural and urban communities in Texas, Massachusetts, and California. According to the CDC, a summary report on project findings is expected by summer 2016.

There is little doubt that complex interactions take place between the individual, family, and community that loop back and affect one another and there is certainly promise in developing this approach further. However, the least developed area is at the distal end of the model—the political economy of the system itself. By this we mean the ways in which the macroeconomic and political forces that shape and develop the institutions, policies, and programs affect the incidence, prevalence, and prevention of obesity.

Social Determinants of Health:

Childhood Obesity and Race/Ethnic and Socioeconomic Disparities

The latest epidemiological data suggest that the incidence of obesity among children may have stabilized, albeit at a high level,[56–60] or declined in some regions around the country in recent years.[61,62] The most authoritative national studies to date by Ogden and colleagues using data from NHANES report that, overall, approximately 17% (or 12.7 million) of children and adolescents aged 2–19 years are obese.[56,57] These rates vary by age group—8.4% of 2-to 5-year-olds, 17.7% of 6-to 11-year-olds, and 20.5% of 12-to 19-year-olds. Significant disparities are also apparent by race/ethnicity—rates are higher among Hispanics (22.4%) and non-Hispanic blacks (20.2%) than among non-Hispanic whites (14.1%).

Even if the epidemic is plateauing among children overall, it is doing so at an alarmingly high level that will have severe health and economic consequences as a significant proportion of children, particularly adolescents, become obese adults with the incipient health and economic consequences.[63,64,65] Moreover, there is evidence that racial and socioeconomic disparities may be widening,[66–71] although there is controversy over these trends and the metrics used to measure the disparities.[72]

As research on obesity, and particularly on obesity prevention, has intensified over the last decade, it is still dominated by a behavioral framework in which

the individual is the primary unit of analysis and intervention. Even when socio-demographics such as income or education are taken into account, they are often only analyzed at the individual level. Although broader social and cultural factors are sometimes considered, they are generally not the central focus. This is not unique to obesity research, but pervades biomedical and health research in general. As Patricia O'Campo has stated:

> The dominant explanatory model used in epidemiologic and social epidemiologic inquiry continues to be the biomedical or "disease-specific model," which seeks to identify mostly individual-based risk markers and risk factors for specified health conditions. Thus, the study of macro-social policies and programs necessitates the expansion of the study designs used to understand and document contextual and macro-level influences on family and individual well-being.[73]

This focus on the individual is changing modestly as studies begin to address the role of the physical, social and economic context of neighborhoods where people live. However this trend seems less frequently applied to advancing our understanding of the economic and social forces that shape those neighborhoods or in the interventions or policies designed to reduce obesity.

Life-Course Perspective

A growing body of evidence supports a life-course perspective, which suggests that early and cumulative disadvantage play a central role in understanding health and health disparities over the lifespan.[74–77] Not only are overweight or obese children more likely to become overweight or obese adults, but these patterns are magnified for children of lower socioeconomic status and from racial and ethnic minorities.[63,72,78,79,80,81] Moreover, these disparities have been shown to begin very early in life.[82,83]

Neighborhood Disparities

Childhood obesity disparities by race/ethnicity and socioeconomic status are well established in the literature.[56,67,84,85] Generally, these disparities are also replicated at the neighborhood level—socially disadvantaged neighborhoods, especially in poor minority communities, experience higher levels of obesity.[86–89] However, there is no consensus on precisely which factors influence BMI. There have been countless studies that have tried to link two key elements in these neighborhoods to obesity—poor access to healthy food (e.g. the presence of food deserts or the preponderance of fast food restaurants) and barriers to physical activity (e.g. pedestrian walkways, bike paths, park access), often modified by other social factors such as the prevalence or perception of crime.

Improving neighborhood access to healthy food and opportunities for physical activity has been one of the cornerstones of policy initiatives around the country for several years,[90,91] but the scientific evidence supporting these notions and initiatives is quite mixed. For example, a recent systematic data review (SDR) by Laura Cobb and her colleagues of 71 studies representing 65 cohorts between 1990 and 2013 examined the relationship between local food environments and obesity and found little evidence linking the two.[92] The authors concluded that, "Despite the large number of studies, we found limited evidence for associations between the food environments and obesity."[93] This does not prove that these associations are not true because, as the authors go on to say, "The predominately null associations should be interpreted cautiously due to the low quality of available studies."[94] Yet this review, which analyzed associations for children and adults separately, found an even higher rate of null findings for children (85% overall).

Research findings on the relationship between the built environment, physical activity, and obesity are also somewhat mixed, although perhaps a bit less so than the studies on the food environment. A recent systematic review of 194 studies by Ferdinand et al. found an overall beneficial relationship between the built environment and PA or obesity.[95] This held true for the 68 studies focused specifically on children (<19 years of age). However, virtually all studies were observational, making causal inferences difficult to prove.

Additionally, there was a dearth of studies focused on minority populations, a result consistent with other reviews.[96] There have been at least two relatively recent critical reviews of other related systematic reviews highlighting multiple deficiencies in these studies including: incompleteness of reporting key methodological approaches; the lack of moderators, mediators, and objective and perceived measures of the built environment; and weak (mainly cross-sectional and observational) study designs that prevent strong inferences of causality.[97,98] It is important to underscore the fact that despite the methodological weaknesses in many of these studies (those relating obesity to access to physical activity and food), many of these relationships may indeed be true. What we do not know with certainty is the precise role of these factors—do they have different impacts in more or less affluent communities? Are they causal? Are they associative and/or do they play more of a mediating or moderating role in the pathway towards obesity?

The concept of neighborhoods can be broadened by considering the social and economic policies that shape them. As Acevedo-Garcia & Osypuk state, "Research on place influences on health has largely focused on neighborhoods. However, a focus exclusively on neighborhoods limits our understanding of health disparities. Individual neighborhoods—and their qualities, risks, and resources—are part of metropolitan-area-wide neighborhood distributions. Neighborhoods are influenced by the larger economic and social context (e.g., housing and labor markets) of their metropolitan area."[99]

Housing and Residential Segregation

Over the past two decades, social epidemiologists have increasingly turned their attention to the relationship between place and health, in part because of the limitations of individual-level factors in explaining health disparities.[100–102] A central part of this focus has been on the impact of residential segregation—the geographic separation of whites from ethnic minorities in residential areas—on health and health disparities.[103,104] According to Acevedo-Garcia & Osypuk, "In conducting research on racial disparities in health, we cannot ignore residential segregation. Because of segregation, contextual differences by race are so pronounced that ignoring them may lead to a misestimation of the effect of individual-level factors."[105]

There are a growing number of studies that directly examine the effects of residential segregation on obesity. Using an index of racial isolation (a common

measure of segregation) as a neighborhood-level factor, Chang conducted multilevel analyses and found that greater racial isolation is associated with a higher BMI among non-Hispanic black adults (after adjusting for covariates including measures of individual socioeconomic status).[106] In a study of metropolitan-level segregation, Kershaw and colleagues found segregation was unrelated to obesity among men but had a beneficial effect on Mexican-American women and a strong adverse impact on African American women. These effects were not mediated by neighborhood poverty.[107] In a national study of 11,142 self-identified African American adults, Corral and colleagues found that at the metropolitan level, segregation was associated with obesity and overweight among African American adults (1-standard deviation increase in African American segregation was associated with a 0.423 increase in BMI and a 14 percent increase in the odds of being overweight; no gender breakdown).[108] More recently, Corral et al. conducted the first national study of segregation's impact on Hispanics' obesity rates.[109] Analyzing data on 8,785 Hispanic adults from 290 metropolitan statistical areas, they found that those living in highly segregated MSAs were 26.4% more likely to be obese compared to those living in low-segregated MSAs (after controlling for age, education, gender, and MSA poverty). However, this study did not examine heterogeneity in this relationship by gender or race. In a more nuanced study, Kershaw and colleagues demonstrated racial variation in the association between segregation and mean BMI among Hispanic women.[110]

Despite the burgeoning literature on residential segregation and health, we have only been able to identify two studies that examined this issue with respect to children and obesity— one by Rossen and Talih in 2014[111] and another by Ryabov in 2015.[112] The studies used different analytic approaches and datasets, but both found a statistically significant relationship between overweight and obesity and residential segregation. Moreover, both included multi-level modeling at the individual and neighborhood levels, an omission in many previous studies. The neighborhood effects, which characterize a community's quality through infrastructure, maintenance, social capital, and other factors, are themselves affected by segregation and are essential to understanding the pathways between segregation, poverty, inequality, and adverse health outcomes such as obesity.

Ryabov used a nationally representative sample from the U.S. Panel Study on Income Dynamics merged with census data (for neighborhood variables) of 1,931 African American, Hispanic and non-Hispanic children and adolescents (data from interviews between 1997-2011). He reported that race-ethnic segregation

accounted for between 5% and 20% of the difference in the odds of being overweight, obese, or having an obesity-related illness (a diagnosis of asthma, diabetes, or hypertension). Rossen and Talih's study included multiple waves of NHANES (from 2001-2010) with a total of 18,199 non-Hispanic white, non-Hispanic black, and Mexican American children (ages 2-18). They used a novel approach to account for individual-level and contextual covariates, which allowed for more accurate comparisons between racial/ethnic groups than previously described in the literature. They stated, "racial/ethnic disparities in the prevalence and severity of excess weight were completely attenuated within matched groups, indicating that racial/ethnic differences were explained by social determinants such as neighborhood socioeconomic and demographic factors."[113] The authors went on to conclude, "Our results highlight the importance of examining more upstream or distal factors such as neighborhood disadvantage or residential segregation in the context of weight disparities, rather than solely focusing on more proximal individual or family factors such as health behaviors."[114]

Housing Mobility

A related area is housing mobility, which could provide tangible benefits to families living in segregated or otherwise economically and socially disadvantaged communities. The Movement to Opportunity Study (MTO) was conducted between 1994 and 1998 in four major American cities and was perhaps the largest randomized trial (4,608 families) ever conducted in the US to evaluate the impact of moving people from impoverished neighborhoods to more affluent ones.[115] Studies have shown that the MTO experiment had a significant impact on reducing obesity among adults, but it had little impact on improving childhood obesity.[116,117]

Recent work done by Chetty, Hendren and Klein approached the MTO data from a new perspective.[118] Based on recent literature indicating that neighborhood disadvantage has a cumulative adverse impact, particularly on long-term economic wellbeing,[119,120] they chose to examine the outcomes of children who moved to less impoverished areas before the age of 13 (average age = 8). In their recent analysis of the MTO data, they found robust evidence that children whose families move to low-poverty neighborhoods when they are young are far more likely to attend college, less likely to become single parents, and earn significantly more as adults than children who remain in those communities or move at later ages. In other words, the benefits of moving away from impoverished neighborhoods decline the longer children are exposed to the adverse conditions in those neighborhoods. This is important for both theoretical and policy implications. On one hand, it supports the powerful adverse impact of cumulative disadvantage and, on the other, it suggests that housing initiatives be tailored to families with young children. This stratified age approach has not yet been applied to health outcomes including obesity, but it is entirely possible that it would yield similar positive results.

Housing Instability

Housing instability has not yet been linked to obesity but there is considerable evidence that it is linked to poor access to care and adverse health outcomes among both children and adults.[121,122,123] Children who involuntarily move frequently do less well in school and suffer other emotional and social problems.[124] The foreclosure crisis stemming from the recent great recession, which by definition has resulted in massive housing instability, has affected more than eight million children.[125] In a study of foreclosure rates in four states (Arizona, California, Florida, and New Jersey), which comprised nearly half of the nation's foreclosures in 2008, Currie and Telik found that housing foreclosures were associated with increased visits to hospitals and emergency rooms for preventable conditions with statistically significant effects for all age groups including children.[126]

Child Development Accounts

There is growing interest in promoting asset development, particularly among children, as a means of addressing the rising and dramatic wealth inequalities in our society. In 2011, due in part to the great recession, a fifth of American households had a median negative net worth, meaning that the value of a household's liabilities exceeds the value of its assets.[127] However, racial and ethnic wealth inequalities have been longstanding—white households had a median net worth more than 15 times larger than black households and 13 times that of Latinos.[128]

Child development accounts also known as child savings accounts come in a number of different forms but generally are designed as a vehicle for long-term asset building and are begun for children as early as birth and allowed to grow over many years. They provide an opportunity to develop financial assets early in life that can be used to build financial security and support educational and career opportunities.[129,130] In addition to the financial characteristics of these accounts, researchers are paying increasing attention to the potential impact of this type of asset-building on child health and wellbeing. Although these studies have not yet been linked with obesity, they generally show that household assets are positively associated with improved educational outcomes and fewer behavioral problems for children.[131–133] One recent study by Huang and colleagues showed some preliminary evidence that child development accounts led to improved social and emotional development particularly among low-income children.[134] Grinstein-Weiss and colleagues reviewed the emerging literature to assess the impact of these accounts, but found that the evidence is too preliminary to definitively prove the long-term effects on children's wellbeing. However, they still conclude that, "long-term asset-building programs—especially early, universal, and progressive programs—seem most likely to improve the wellbeing of low-income children."[135]

Immigration and Acculturation

For immigrants, length of time spent living in the US is associated with the adoption of new lifestyle and health behaviors as well as a higher risk of becoming overweight or obese.[136,137,138] Initially, immigrants enjoy better health outcomes than their US peers, but this trend tends to diminish with length of residence or degree of acculturation. After controlling for a range of factors such as ethnicity, socioeconomic status, television viewing, and physical activity, "…first-generation immigrant children, overall, had 26% lower odds of obesity than native-born children."[139] When compared with their US-born peers, studies have found that immigrant children and adolescents across ethnic groups tend to have significantly healthier

dietary patterns, lower calorie and fat intake, and spend less time viewing television.[136] Physical activity is an exception, as foreign-born children tend to be less physically active.[140]

With increased exposure to the US environment, sedentary lifestyle and poor nutrition become more prevalent.[141,142] Within 10–15 years of arriving in the US, the overweight and obesity rates seen in immigrants approach or even surpass that of the general population.[138] As traditional food is consumed less, intake of fat, sugar, and calories rises.[141] For example, Hispanics tend to consume more fast food and fat and less fruit and vegetables in association with acculturation, and both black and white immigrant children watch more television per day in each ensuing generation.[136] One study of Mexican children and adolescents found that both those that had been born in Mexico and raised in the US and those born and raised in the US were more likely to be obese than those born and raised in Mexico.[143] These patterns differ across immigrant groups. For example, Asian immigrants tend to maintain more positive health behaviors and outcomes with acculturation.[137] The association between acculturation and obesity is further supported in a 2015 study by Ishizawa & Jones, which found that immigrants living in areas with higher proportions of foreign-born residents and linguistically isolated households (in which no adult speaks only English and no adult speaks English "very well") experience lower obesity levels. These results suggest that when immigrants live in a concentrated area, it may slow down acculturation and adoption of new health behaviors, resulting in better weight outcomes.[144]

A systematic review of obesity prevention interventions in US immigrant populations by Tovar et al. included five studies specific to children.[141] Those that targeted caregiver influence on child health showed improvements in BMI while those targeting pre-school or childcare settings saw no effects. Successful interventions had a cultural focus and targeted multiple behaviors, such as diet and physical activity and parent behaviors. Limitations of this review included relatively short study durations with few studies measuring degree of acculturation. A general lack of data emphasizes the need for further high quality research in this area. Finally, new and targeted approaches are needed among immigrant children to prevent their progression toward obesity in succeeding generations.

Breastfeeding

Breastfeeding is often viewed as a protective factor in relation to childhood obesity; initiation and duration of breast milk consumption have been linked in numerous studies to better weight outcomes over time through both nutritional and behavioral pathways.[145] The IOM, CDC, and American Academy of Pediatrics all recommend breastfeeding as a means to prevent obesity.[146] However, as the 2012 IOM report notes, in this area of research "…the nature of the study designs makes it difficult to infer causality."[147] Studies reach mixed conclusions, and those that do find evidence of an association between breastfeeding and weight status later in life often do not, or cannot, control for important confounding factors. Other pre-and post-natal variables, especially those pertaining to a mother's health status and behaviors, as well as early childhood factors such as nutrition and PA levels, also correlate with early child obesity incidence.[148] This makes it difficult to define exactly what effect breastfeeding has on later child weight outcomes, especially given that negative trends in these variables often tend to co-occur.

There is no lack of research supporting the hypothesis that breastfeeding results in more desirable child weight outcomes. One study saw a 38%-51% reduction in obesity risk at age nine depending on breastfeeding duration,[145] while a meta-analysis found a 22% decrease in risk of childhood obesity in breastfed children versus those who were never breastfed.[149] Unhealthy weight gain during infancy and early childhood increases the likelihood of obesity later in life.[150] The composition of breast milk, which is moderate in calories and

nutrients, may slow patterns of growth in comparison with children who are formula-fed.[145,149] Formula, in comparison, provides higher levels of fats and proteins which have been associated with higher weight in early childhood.[149] There are also possible behavioral explanations; some studies show that breastfeeding may help increase the mother's awareness of her child's hunger and satiety cues.[145]

Other researchers point out the difficulty of verifying a definite link between breastfeeding and healthy childhood weight. Lumeng et al. concluded that evidence to support breastfeeding as an obesity prevention strategy is lacking,[151] and a review by Monasta et al. notes that "it is difficult to establish a casual association with obesity."[152] Another study found breastfeeding to be a factor in childhood overweight, but the effects were not statistically significant,[153] while a large 2013 RCT found that improving breastfeeding duration and exclusivity did not prevent overweight or obesity at age 11.[154]

Serious confounders of the relationship between breastfeeding and childhood obesity further impede reaching any definitive conclusions. Reviews have suggested that the associated positive effects of breastfeeding on reducing obesity risk are eliminated after controlling for maternal BMI, smoking, and socioeconomic factors.[155] Higher maternal weight and/or weight gain is considered to be a significant risk factor for high birth weight or later adiposity outcomes,[146,148,151,156,157] and overweight mothers are also less likely to breastfeed.[158] Dixon et al. state, "Maternal obesity is one of the strongest and most reliable predictors of later obesity in children. Infants born to overweight mothers are more likely to be born large for gestational age, are less likely to be breastfed, and are at higher risk for obesity and type 2 diabetes in later life."[159] Maternal weight is also associated with lower socioeconomic status and education, two additional factors that may influence childhood obesity risk.[158]

The complex relationship between maternal weight and other variables associated with child weight outcomes confound any conclusions reached without controlling for all factors involved. Child obesity risk can be influenced by other maternal characteristics such as diabetes incidence, smoking status, experience of food insecurity, socioeconomic status, and experience of antenatal depression or stress. And as a child grows, risk is further influenced by sleep duration, physical activity, diet, and sedentary behavior.[148,158] One study points out that it is possible that "…breastfeeding simply serves as a marker, albeit a powerful marker, of other nutritional or lifestyle-related exposures."[160]

While the pathways by which breastfeeding may be associated with childhood obesity are uncertain, disparities in breastfeeding prevalence have been well documented. Minority women are less likely to have characteristics associated with breastfeeding initiation such as higher income and education levels.[161] Studies in ethnic minorities and poor communities find a negative association between breastfeeding and socioeconomic status,[149] as well as lower rates of breastfeeding initiation among black women than other ethnic groups. Initiation rates are higher in Hispanic and Asian populations, but are still lower than in white women.[162] Shafai et al. point out that most mothers enrolled in WIC do not breastfeed and that, in fact, the majority of the program's expenditures are used to purchase formula.[163] One study that examined ethnicity and breastfeeding prevalence at age four did not find breastfeeding to have a mediating effect on obesity prevalence,[153] while another found "…that infant feeding practices were the primary mechanism mediating the role between socioeconomic status and early childhood obesity."[164]

The Industrial Food System

Dramatic changes in the food system in the US over the past 50 years are intricately linked to the obesity epidemic. There is a growing consensus that the evolution of industrially produced and highly processed energy dense foods has lead to a significant increase in caloric intake since at least the 1970s and is one of the

main drivers of the current epidemic.[165,166,167] According to the US Department of Agriculture, the daily calorie intake per person increased from 2,039 in 1970 to 2,544 in 2010, and refined grains and added fats and oils, products of the industrial food system, contributed 79% of the increase in calories over this time period.[168]

United States agricultural policy plays a pivotal role through its subsidies of crops like corn and soybeans which, when transformed into corn syrup and oils, are key ingredients in processed, refined, and calorie dense foods and beverages. Programs managing commodity crop production, first established to help keep prices stable and insure that farmers would have steady income, were shifted to maximize cheap production of these crops in the 1970s with the idea that US farmers could expand and profit in the world market.[169] By encouraging overproduction, these policies cause prices for commodity crops to fall (and lower prices for the food and beverage industry). Farmers are then reimbursed for their losses and the cycle continues.[170] In contrast, there are few incentives to grow fruits and vegetables due to the lack of subsidies.[169,171] In the US, "…the real (inflation-adjusted) cost of fresh fruits and vegetables has risen nearly 40% in the past 20 years while the real cost of soda pop has declined more than 20% (converted to real dollars)."[172] The US is the world's largest producer of both corn and soybeans and much of what is produced is also consumed within the country.

The surplus of cheap food produced as a result of these practices has a direct influence on other government policies. The USDA distributes surplus food through federal food assistance programs, many of which it administers, even though these foods are often already overconsumed when compared to USDA dietary guidelines.[170] The National School Lunch Program is affected as well—the USDA states that it "…must balance its responsibility to provide healthy school meals with its responsibility to support and promote US agricultural production."[173] Many commodity crops are well suited for long-distance shipping and the export of these crops is often facilitated through trade agreements. Research on the potential impacts on diet of international trade policies such as NAFTA and CAFTA-DR (composed of the US, Dominican Republic, and several Central American countries) in low and middle-income countries finds that these agreements were likely to increase availability and lower prices of processed foods and their ingredients.[171]

By driving down prices for certain crops, US agricultural policy creates a food environment in which energy-dense foods become more affordable and increasingly represent a large portion of overall caloric intake.[174,175] When prices for certain crops are low, the companies involved in food production are financially motivated to make as large a portion of their product consist of these inexpensive ingredients (specifically corn syrup and soybean oil) as possible. This results in foods with less nutritional value and higher caloric content being more readily available to the consumer at lower prices.[176] The added sugar intake from corn sweeteners alone rose 359% from 1970 to 2007[175] and, as of 2006, soy oil accounted for 20% of the average American's daily calories.[170] The United States has "…the cheapest food in history when measured as a fraction of disposable income,"[177] — less money can purchase more calories. The rise in consumption of low-cost, high-fat and high-sugar "junk" foods and sweetened beverages produced from subsidized crops has paralleled the rise in the obesity epidemic.

In more descriptive literary terms, Specter recently wrote about America's fast food consumption in *The New Yorker*:

> Each month, more than two hundred million people eat at least one meal at one of the hundred and sixty thousand fast-food restaurants in the United States. McDonald's alone serves twenty-six million people every day at its fourteen thousand American outlets—more than the population of Australia. Millions more visit Burger King, Wendy's, Subway, Pizza Hut, Dunkin' Donuts, In-N- Out Burger, as well as the other chains that

occupy virtually every highway, strip mall, and town center in the nation.[178]

A large body of evidence has accumulated indicating a strong association between sugar-sweetened beverages and obesity, as well as related chronic diseases. Malik & Hu's 2015 review examining added sugar intake and SSB consumption in relation to obesity found SSB's to be "…the single greatest source of calories and added sugars in the U.S. diet, accounting for nearly one-half of all added sugar intake."[179] Many studies have linked sugar-sweetened beverage consumption to childhood weight gain in particular.[180] Each serving of SSB consumed daily is associated with a 0.06 unit increase in child BMI over one year,[181] and reducing consumption has been shown to significantly reduce weight gain and adiposity in children and adolescents.[182]

Although there is no definitive proof, the pattern of expenditures on fruits and vegetables by socioeconomic status may contribute to obesity disparities. For example, average expenditures on fruits and vegetables for low-income households fell between 1991 and 2000 at the same time these expenditures increased for higher income households.[183] As unhealthy food and beverages produced from subsidized crops become less expensive, they become more readily available to low-income families who are already at elevated risk for overweight and obesity.[174,184] Due to their higher consumption of these high-calorie but low-nutrient products,[185,186] changes in price are more likely to affect weight trends in both minorities and low-income populations.

Increased consumption of these foods and beverages is driven by their convenience as well as their affordability. Since the 1960s, partly as a result of dramatic increases in women's participation in the paid labor force,[187] time spent on food preparation has decreased across all socioeconomic groups with low-income groups showing the greatest decline in the proportion of adults cooking.[188] This results in a higher proportion of foods consumed that require little preparation (and tend to be highly processed) as well as a greater proportion of foods consumed at home that were prepared elsewhere (such as fast-food restaurants, the main contributor to this increase).[189] These trends are alarming because the frequency of family meals and consumption of home-prepared dinners show positive effects on child dietary intake in low-income households.[190] Efforts to educate parents on purchasing and preparation of more nutritious foods on a budget, such as USDA SNAP-Education or the Cooking Matters program, may help families to increase fruit and vegetable intake, lower fast food consumption, and prepare healthier low-cost meals at home.[191,192]

According to Cohen and colleagues, while under-consumption of healthy foods like fruits and vegetables increases risk for obesity, overconsumption of processed foods often produced from subsidized crops may have an even greater effect on overall calorie intake.[193] They found that overconsumption of discretionary calories from low-nutrient foods like candy, cookies, salty snacks, and SSBs was greater than under consumption of fruits and vegetables. Many question how great an impact increased physical activity or FV intake can make on obesity outcomes without finding a way to lower the consumption of energy-dense, subsidized food and beverages.[175,182]

Marketing and Advertising

The marketing of foods and beverages low in nutritional value yet high in calories, sugar, fat, and sodium has been shown to have an impact both on the magnitude of the obesity epidemic and on disparities in obesity prevalence. The high proportion of inexpensive, calorie-dense foods consumed by poor and minority populations makes these groups a profitable advertising target. This is documented by a growing body of evidence demonstrating that advertisements featuring unhealthy food and beverage products are shown more frequently in media targeted at certain minority groups. Specifically, a disproportionate amount of unhealthy food marketing is directed at minority children.[194]

In addition to television advertising, the food and

beverage industries have taken advantage of new ways to reach children and adolescents. Many companies have websites or online games targeting young people, foods are often tied into popular video games or movies, companies have a presence on social media, and they often sponsor activities or athletic events.[195] Unhealthy foods and drinks even have a marketing presence in schools, where logos are featured on signs, scoreboards, vending machines, and sports equipment, and related products are used in fundraisers. Companies also sponsor educational materials.[196]

After identifying marketing of unhealthy food and beverages as a driver of increased population caloric intake in recent years, the 2012 Institute of Medicine (IOM) report, *Accelerating Progress in Obesity Prevention*, concluded that, "In short, marketing works effectively to cause children to prefer, request, and consume sugary, fatty, and salty foods marketed to them."[197]

Food advertising and marketing strategies exploit poor and vulnerable populations' sensitivities to costs,[194] since lower quality diets are more affordable.[198] A recent review by Larson & Story found that "Substantial research shows low income and minority youth of all ages tend to consume less whole fruits, vegetables, whole grains, and low-fat milk; consume more fast food and sweetened beverages; and have poorer knowledge of nutritional recommendations for health."[199] A research brief conducted by Kumanyika and colleagues at the African American Collaborative Obesity Research Network (AACORN) reported that sugar-sweetened beverages are consumed more often by minorities. Specifically, Black Americans consume more calories from weight gain-promoting SSBs than their White counterparts. This may be due in part to the fact that they are targeted for SSB marketing. Black adolescents in particular have shown significant increases in SSB consumption since the 1990s, while consumption among White adolescents remained relatively stable.[200]

Trends in higher advertising exposure for minorities and youth suggest that "ethnic minority youth are likely the most heavily targeted segment of the population."[201] A recent study by the Rudd Center for Food Policy and Obesity analyzed advertising practices among 26 companies in the restaurant, food, and beverage industries.[202] They found that the 18% of brands advertising disproportionately frequently to children were significantly more likely to target their ads at minorities. The same report also found that Black children and adolescents are exposed to 70% more food-related ads than their White counterparts. In geographic areas with higher proportions of Black children or lower-income households, children are exposed to more television advertisements for sugar-sweetened beverages and fast-food restaurants.[203]

One study comparing Spanish and English-language advertising during children's television programming found a significantly lower amount of advertisements for food and beverage products on Spanish-language channels. However, the nutritional quality of the foods featured in Spanish commercials was markedly worse. Industry self-regulation was also found to have considerably less positive results in Spanish-language marketing practices.[204] Minority children are also more often exposed to other advertising mediums, such as unhealthy food promotion on food packaging and in print ads.[205] Yancey et al. found a higher density of outdoor advertising in African American and Latino zip codes when compared with white areas.[206] The unhealthy diet promoted in advertisements is associated with child overweight and obesity as it influences child food preferences, the foods they request from caregivers, and short term food choices, making it a likely factor in child obesity prevalence and disparities.[197, 205,207]

Industry guidelines related to reducing children's exposure to advertising have been published and many companies have pledged to improve practices.[207] However, an analysis comparing the food advertisements that appeared during children's TV programs in 2007 versus 2013 found no significant improvement in overall nutritional quality of the foods featured since industry self-regulation had been adopted.[208] A review published in 2013 found a noteworthy disparity in research evaluating the effectiveness of worldwide industry regulation and self-regulation.[209] Industry-sponsored studies indicate major reductions in unhealthy product promotion and children's exposure to such advertising, while non-industry-sponsored reports find little to no reductions over recent years except in the case of state regulation. A review by Chambers et al., 2015 found that seven of nine real world studies (rather than modeling studies or controlled experiments) examining statutory regulation successfully reduced the exposure of children to advertisements for foods high in fat, sugar, and salt as well as the purchase of these foods.[210]

Attempts by the federal government to improve standards in the US have shown little result. A 2012 review found that the government had made no substantial progress towards the goals recommended by the IOM in 2005 to improve nutritional quality of children's advertising.[211] The government has found it difficult to improve even voluntary standards. The Joint Task Force on Media and Childhood Obesity established in 2006 proved unable to reach agreement between the government and food and media industries on standards to determine what foods qualify as "healthy" or set limits on advertising of unhealthy foods during children's programming. The Interagency Working Group of Food Marketed to Children, formed in 2009, proposed voluntary standards for industry self-regulation which were found by Congress to be "overly restrictive and unrealistic" in 2011 and never released.[212] The White House Task Force on Childhood Obesity was established in 2010 to make recommendations for improving child obesity. It recommends strategies to decrease child obesity through industry self-regulation but also points out that government intervention may be necessary.[212] The position of the World Health Organization is that "industry self-regulation will not be sufficient."[213]

Regulation of the food and beverage industries will be more effective if these industries are monitored using publicly available data,[214] which could also shed light on the food industry's influence over the policies that relate to its financial interests. According to the 2012 IOM report,[197] reducing child and adolescent exposure to the marketing of unhealthy foods will accelerate obesity prevention. Furthermore, "These actions also may help reduce disparities in obesity rates for those youth who have greater exposure to media, including Black, Hispanic, and Asian youth."[215]

Other countries have already enacted policies with the goal of reducing child-directed advertising—various advertising bans exist in Quebec, Norway, Sweden, and the UK. Modeling studies indicate promising results if similar policies were established in the US.

For example, the potential result of eliminating tax subsidies for TV advertising of unhealthy products to children would be a decrease in BMI of up to 0.028 units per child[216] and banning television advertising of fast foods directed at children could reduce child and adolescent obesity up to one percentage point by 2032.[217]

Conflicts of Interest

Funding provided by the food and beverage industries is used to support a large portion of obesity and nutrition-related research. This creates opportunities for research beyond what government resources provide, but it raises questions regarding the validity of such studies and the necessity for closer examination of how funding may bias outcomes. Research evaluating the effects of certain food and beverages on overweight and obesity trends has potential to generate negative associations with such products, thereby creating a motivation for companies to fund studies with outcomes in their best interests. Even if funding does not directly influence results, it may be more likely to be used to support research questions that are expected to produce favorable outcomes for industry.[218]

One way studies can be examined for bias due to funding source is to compare research reporting quality; lower quality may reflect poor study design or analysis that might in turn skew results. Two studies examining this aspect of obesity and nutrition research were not able to detect significant differences in study quality in relation to funding source.[219,220] Another study, which examined financial sponsorship of articles pertaining to soft drinks, juice, milk and health, found that no studies with all industry support reached an unfavorable conclusion and articles funded entirely by industry were "…approximately four to eight times more likely to be favorable to the financial interests of the sponsors than articles without industry-related funding."[221] In 2013, Bes-Rastrollo et al. conducted a review of systematic reviews regarding research and potential conflicts of interest in studies of sugar-sweetened beverage consumption and weight gain or obesity and concluded:

> Among those reviews without any reported conflict of interest, 83.3% of the conclusions (10/12) were that SSB consumption could be a potential risk factor for weight gain. In contrast, the same percentage of conclusions, 83.3% (5/6), of those SRs disclosing some financial conflict of interest with the food industry were that the scientific evidence was insufficient to support a positive association between SSB consumption and weight gain or obesity. Those reviews with conflicts of interest were five times more likely to present a conclusion of no positive association than those without them.[222]

The support provided by the food and beverage industries to groups responsible for conducting research and creating health guidelines in the United States is a major cause for concern. Coca-Cola has given millions of dollars in recent years to both the Academy of Pediatrics and the Academy of Nutrition and Dietetics, just two of the many health-related groups with financial ties to the company. This may in turn influence health recommendations and help to minimize research findings that are not beneficial to the company.[223] However, funding from sources other than the federal government is currently a driver in the field of nutrition and obesity research. In order for industry-supported research to establish credibility, clear guidelines need to be established to avoid possible conflicts of interest. Without greater transparency and more rigorous standards, research integrity cannot be maintained.

Conclusion

There are hopeful signs that the epidemic of childhood obesity may have stabilized, albeit at a very high level, with approximately 13 million obese children and adolescents. But there is also troubling evidence that socioeconomic and racial and ethnic disparities may be widening.

It is unlikely that the current state of intervention strategies will stem the tide of the epidemic nor significantly close the gaps in racial/ethnic and socioeconomic disparities without addressing the underlying social determinants of health. A systems science approach, which attempts to address obesity at the community level in a holistic way, is emerging and has potential, but it must meaningfully incorporate the underlying social and economic conditions into its models.

A number of policy-related proposals, mainly based on modeling studies, are promising and should be explored further. These include improving early childcare standards, eliminating tax subsidies for television advertising of unhealthy food directed at children, subsidies for fruit and vegetable consumption, imposing a sugar-sweetened beverage tax, and increasing active physical education time and improved nutrition in schools.

We know that some of our national agricultural policies and private commercial interests from the food and beverage industry are at odds with the public's health. This must be addressed. Finally, there should be a greater emphasis in future research and policy on addressing upstream factors, such as reducing poverty and inequality, neighborhood disadvantage, and residential segregation to reduce racial/ethnic and socioeconomic weight disparities, rather than only focusing on individual or family factors such as health behaviors or education. It will take leadership and a sustained political movement to make progress along these lines, but there are promising signs that it has already begun.

Bibliography

Acevedo-Garcia, D., Lochner, K. A., Osypuk, T. L., & Subramanian, S. V. (2003). Future directions in residential segregation and health research: a multilevel approach. *American Journal of Public Health*, *93*(2), 215-221. doi:10.2105/AJPH.93.2.215

Acevedo-Garcia, D., & Osypuk, T. L. (2008). Invited commentary: residential segregation and health—the complexity of modeling separate social contexts. *American Journal of Epidemiology*, *168*(11), 1255-1258. doi:10.1093/aje/kwn290

Adler, N. E., & Stewart, J. (2010). Health disparities across the lifespan: meaning, methods, and mechanisms. *Annals of the New York Academy of Sciences*, *1186*(1), 5-23. doi:10.1111/j.17496632.2009.05337.x

Adler, S. (2015). Perspective: Keeping kids healthy means keeping schools free of unhealthy food ads. *Reporting on Health, The Health Journalism Fellowship.* Retrieved from http://bit.ly/1Hi1Ak9

Appelhans, B. M., Waring, M. E., Schneider, K. L., & Pagoto, S. L. (2014). Food preparation supplies predict children's family meal and home-prepared dinner consumption in low-income households. *Appetite, 76*, 1. doi:10.1016/j.appet.2014.01.008

Bae, D., Wickrama, K. A. S., & O'Neal, C. W. (2014). Social consequences of early socioeconomic adversity and youth BMI trajectories: Gender and race/ethnicity differences. *Journal of Adolescence*, *37*(6), 883-892. doi:10.1016/j.adolescence.2014.06.002

Baker, P. R. A., Francis, D. P., Soares, J., Weightman, A. L., & Foster, C. (2015). Community wide interventions for increasing physical activity. *The Cochrane Database of Systematic Reviews, 1*, Art. No.: CD008366. doi:10.1002/14651858.CD008366.pub3.

Bambra, C., Hillier, F., Cairns, J., Kasim, A., Moore, H., & Summerbell, C. (2015). How effective are interventions at reducing socioeconomic inequalities in obesity among children and adults? two systematic reviews. *Public Health Research*, *3*(1). doi:10.3310/phr03010

Barrett, J. L., Gortmaker, S. L., Long, M. W., Ward, Z. J., Resch, S. C., Moodie, M. L., ... & Cradock, A. L. (2015). Cost effectiveness of an elementary school active physical education policy. *American Journal of Preventive Medicine*, *49*(1), 148-159. doi:10.1016/j.amepre.2015.02.005

Beauchamp, A., Backholer, K., Magliano, D., & Peeters, A. (2014). The effect of obesity prevention interventions according to socioeconomic position: a systematic review. *Obesity Reviews*, *15*(7), 541-554. doi:10.1111/obr.12161

Bender, M. S., & Clark, M. J. (2011). Cultural adaptation for ethnic diversity: A review of obesity interventions for preschool children. *Californian Journal of Health Promotion*, *9*(2), 40-60. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3805036/

Bes-Rastrollo, M., Schulze, M. B., Ruiz-Canela, M., & Martinez-Gonzalez, M. A. (2013). Financial Conflicts of Interest and Reporting Bias Regarding the Association between Sugar-Sweetened Beverages and Weight Gain: A Systematic Review of Systematic Reviews. *Plos Medicine*, *10*(12), 1-9. doi:10.1371/journal.pmed.1001578

Black, J. L., Macinko, J., Dixon, L. B., & Fryer Jr, G. E. (2010). Neighborhoods and obesity in New York City. *Health & Place*, *16*(3), 489-499. doi:10.1016/j.healthplace.2009.12.007

Bleich, S. N., Segal, J., Wu, Y., Wilson, R., & Wang, Y. (2013). Systematic review of community-based childhood obesity prevention studies. *Pediatrics*, *132*(1), e201-e210. doi:10.1542/peds.201328 0886

Blisard, W. N., Stewart, H., & Jolliffe, D. (2004). *Low-income households' expenditures on fruits and vegetables*. Washington, DC: US Department of Agriculture, Economic Research Service. Retrieved from http://bit.ly/1NcjJb5

Boelsen-Robinson, T., Peeters, A., Beauchamp, A., Chung, A., Gearon, E., & Backholer, K. (2015). A systematic review of the effectiveness of whole-of-community interventions by socioeconomic position. *Obesity Reviews, 16*(9), 806-816. doi:10.1111/obr.12297

Bond, M., Wyatt, K., Lloyd, J., & Taylor, R. (2011). Systematic review of the effectiveness of weight management schemes for the under fives. *Obesity Reviews*, *12*(4), 242-253. doi:10.1111/j.1467-789X.2010.00713.x

Boshara, R., & Emmons, W. R. (2015). A balance sheet perspective on financial success: Why starting early matters. *Journal of Consumer Affairs*, *49*(1), 267-298. doi: 10.1111/joca.12056

Braveman, P., & Barclay, C. (2009). Health disparities beginning in childhood: a life-course perspective. *Pediatrics*, *124*(Supplement 3), S163-S175. doi:10.1542/peds.2009-1100D

Branscum, P., & Sharma, M. W. (2011). A systematic analysis of childhood obesity prevention interventions targeting Hispanic children: lessons learned from the previous decade. *Obesity Reviews*, *12*(5), e151-e158. doi:10.1111/j.1467-789X.2010.00809.x

Brennan, L.K., Brownson, R.C., & Kauh, T. J. (2015). Evaluation of Healthy Kids, Healthy Communities. *Journal of Public Health Management and Practice*, *21*(Supp 3), S4-S7. doi: 10.1097/PHH.0000000000000186

Brewer, M., & Kimbro, R. T. (2014). Neighborhood context and immigrant children's physical activity. *Social Science & Medicine (1982), 116*, 1-9. doi:10.1016/j.socscimed.2014.06.022

Bures, R. M., Mabry, P. L., Orleans, C. T., & Esposito, L. (2014). Systems science: A tool for understanding obesity. *American Journal of Public Health, 104*(7), 1156-1156. doi:10.2105/AJPH.2014.302082

Casagrande, S. S., Whitt-Glover, M. C., Lancaster, K. J., Odoms-Young, A. M., & Gary, T. L. (2009). Built environment and health behaviors among African Americans: a systematic review. *American Journal of Preventive Medicine*, *36*(2), 174-181. doi:10.1016/j.amepre.2008.09.037

Centers for Disease Control and Prevention. (2013). Vital Signs: Obesity among low-income, preschool-aged children — United States, 2008–2011. *Morbidity and Mortality Weekly Report*, 62(31), 629-34. Retrieved from http://1.usa.gov/1Mw1Ctp

Chambers, S. A., Freeman, R., Anderson, A. S., & MacGillivray, S. (2015). Reducing the volume, exposure and negative impacts of advertising for foods high in fat, sugar and salt to children: A systematic review of the evidence from statutory and self-regulatory actions and educational measures. *Preventive Medicine, 75*, 32-43. doi:10.1016/j.ypmed.2015.02.011

Chang, V. W. (2006). Racial residential segregation and weight status among U.S. adults. *Social Science & Medicine*, 63, 1289-1303. doi:10.1016/j.socscimed.2006.03.049

Chapman, D. J., & Pérez-Escamilla, R. (2012). Breastfeeding among minority women: Moving from risk factors to interventions. *Advances in Nutrition (Bethesda, Md.), 3*(1), 95-104. doi:10.3945/an.111.001016

Chetty, R., Hendren, N., & Klein, L. (2015). The effects of exposure to better neighborhoods on children: new evidence from the Moving to Opportunity Experiment, Unpublished manuscript, retrieved from http://scholar.harvard.edu/files/lkatz/files/mto_manuscript_may2015.pdf

Chriqui, J. F., Pickel, M., & Story, M. (2014). Influence of school competitive food and beverage policies on obesity, consumption, and availability: a systematic review. *JAMA Pediatrics*, *168*(3), 279-286. doi:10.1001/jamapediatrics.2013.4457

Cobb, L. K., Appel, L. J., Franco, M., Jones-Smith, J. C., Nur, A., & Anderson, C. A. (2015). The relationship of the local food environment with obesity: A systematic review of methods, study quality, and results. *Obesity*, *23*(7), 1331-1344. doi:10.1002/oby.21118

Cohen, D. A., Sturm, R., Scott, M., Farle, T. A., & Bluthenthal, R. (2010). Not enough fruit and vegetables or too many cookies, candies, salty snacks, and soft drinks?. *Public Health Reports*, *125*(1), 88-95. Retrieved from http://www.jstor.org/stable/41434752

Conley, D. (2001). Capital for college: Parental assets and postsecondary schooling. *Sociology of Education*, 59-72. doi: 10.2307/2673145.

Corral, I., Landrine, H., Hao, Y., Zhao, L., Mellerson, J. L., & Cooper, D. L. (2011). Residential segregation, health behavior

and overweight/obesity among a national sample of African American adults. *Journal of Health Psychology, 17*(3), 371-378. doi:10.1177/1359105311417191

Corral, I., Landrine, H., & Zhao, L. (2014). Residential segregation and obesity among a national sample of Hispanic adults. *Journal of Health Psychology*, *19*(4), 503-508. doi:10.1177/1359105312474912

Crowder, K., & South, S. J. (2011). Spatial and temporal dimensions of neighborhood effects on high school graduation. *Social Science Research*, *40*(1), 87-106. doi:10.1016/j.ssresearch.2010.04.013

Currie, J., & Tekin, E. (2014). *Is there a Link between Foreclosure and Health?* Unpublished manuscript. Retrieved from http://bit.ly/1NFOxve

DeBoer, M.D. & Scharf R.J. (In-press). Sugar-sweetened beverages and children's health. *Annual Review of Public Health, 37.*

Delavari, M., Sønderlund, A. L., Swinburn, B., Mellor, D., & Renzaho, A. (2013). Acculturation and obesity among migrant populations in high income countries-a systematic review. *BMC Public Health*, *13*(1), 458. doi:10.1186/1471-2458-13-458

Dietz, W. H. (2015). The response of the US Centers for Disease Control and prevention to the obesity epidemic. *Annual Review of Public Health*, *36*(1), 575-596. doi:10.1146/annurevpublhealth-031914-122415

Ding, D., & Gebel, K. (2012). Built environment, physical activity, and obesity: what have we learned from reviewing the literature? *Health & Place*, *18*(1), 100-105. doi:10.1016/j.healthplace.2011.08.021

Dixon, B., Peña, M. M., & Taveras, E. M. (2012). Lifecourse approach to racial/ethnic disparities in childhood obesity. *Advances in Nutrition: An International Review Journal*, *3*(1), 73-82. doi:10.3945/an.111.000919

Drewnowski, A., & Specter, S. E. (2004). Poverty and obesity: the role of energy density and energy costs. *The American Journal of Clinical Nutrition*, *79*(1), 6-16. Retrieved from http://ajcn.nutrition.org/content/79/1/6.long

Driessen, C. E., Cameron, A. J., Thornton, L. E., Lai, S. K., & Barnett, L. M. (2014). Effect of changes to the school food environment on eating behaviours and/or body weight in children: a systematic review. *Obesity Reviews*, *15*(12), 968-982. doi:10.1111/obr.12224

Elbel, B., Gyamfi, J., & Kersh, R. (2011). Child and adolescent fast-food choice and the influence of calorie labeling: a natural experiment. *International Journal of Obesity*, *35*(4), 493-500. doi:10.1038/ijo.2011.4

Faulkner, G. E., Grootendorst, P., Nguyen, V. H., Andreyeva, T., Arbour-Nicitopoulos, K., Auld, M. C., ... & Windmeijer, F. (2011). Economic instruments for obesity prevention: results of a scoping review and modified delphi survey. *International Journal of Behavioral Nutrition and Physical Activity*, *8*(1), 109-122. doi:10.1186/1479-5868-8-109

Ferdinand, A.O., Sen, B., Rahurkar, S., Engler, S., & Menachemi, N. (2012). The relationship between built environments and physical activity: a systematic review. *American Journal of Public Health*, *102*(10), e7-e13. doi:10.2105/AJPH.2012.300740

Finegood, D.T. (2011). The complex systems science of obesity. In Cawley J.H. (Ed.), *The Oxford Handbook of the Social Science of Obesity*. New York, NY: Oxford University Press.

Fortson, J. G., & Sanbonmatsu, L. (2010). Child health and neighborhood conditions results from a randomized housing voucher experiment. *Journal of Human Resources*, *45*(4), 840-864. doi:10.1353/jhr.2010.0025

Frederick, C. B., Snellman, K., & Putnam, R. D. (2014). Increasing socioeconomic disparities in adolescent obesity. *Proceedings of the National Academy of Sciences*, *111*(4), 1338-1342. doi:10.1073/pnas.1321355110

Friedline, T., & Rauktis, M. (2014). Young people are the front lines of financial inclusion: A review of 45 years of research. *Journal of Consumer Affairs*, *48*(3), 535-602. doi: 10.1111/joca.12050

Friel, S., Hattersley, L., Snowdon, W., Thow, A., Lobstein, T., Sanders, D., & ... Walker, C. (2013). Monitoring the impacts of trade agreements on food environments. *Obesity Reviews*, *14 Suppl 1,* 120-134. doi:10.1111/obr.12081

Galbraith-Emami, S., & Lobstein, T. (2013). The impact of initiatives to limit the advertising of food and beverage products to children: A systematic review. *Obesity Reviews, 14*(12), 960-974. doi:10.1111/obr.12060

Gebel, K., Bauman, A. E., & Petticrew, M. (2007). The physical environment and physical activity: a critical appraisal of review articles. *American Journal of Preventive Medicine*, *32*(5), 361-369. doi:10.1016/j.amepre.2007.01.020

Gibbs, B. G., & Forste, R. (2014). Socioeconomic status, infant feeding practices and early childhood obesity. *Pediatric Obesity, 9*(2), 135-146. doi:10.1111/j.2047-6310.2013.00155.x

Giskes, K., van Lenthe, F.J., Turrell, G., Kamphuis, C.B., Brug, J., & Mackenbach, J.P. (2008). Socioeconomic position at different stages of the life course and its influence on body weight and weight gain in adulthood: a longitudinal study with 13-year follow-up. *Obesity,* 16(6), 1377–1381. doi:10.1038/oby.2008.54

Gittelsohn, J., Mui, Y., Adam, A., Lin, S., Kharmats, A., Igusa, T., & Lee, B.Y. (2015).Incorporating systems science principles into the development of obesity prevention interventions. Principles, benefits, and challenges. *Current Obesity Reports, 4*(2), 174-181. doi:10.1007/s13679015-0147-x

Gordon-Larsen, P., Suchindran, C., The, N. S., North, K. E., & Popkin, B. M. (2010). Association of adolescent obesity with risk of severe obesity in adulthood. *Journal of the American Medical Association, 304*(18), 2042-2047. doi:10.1001/jama.2010.1635

Gortmaker, S. L., Long, M. W., Resch, S. C., Ward, Z. J., Cradock, A. L., Barrett, J. L., ... & Wang, Y. C. (2015). Cost effectiveness of childhood obesity interventions: evidence and methods for CHOICES. *American Journal of Preventive Medicine*, *49*(1), 102-111. doi:10.1016/j.amepre.2015.03.032

Grier, S. A., & Kumanyika, S. K. (2008). The context for choice: Health implications of targeted food and beverage marketing to african americans. *American Journal of Public Health, 98*(9), 1616-1629. doi:10.2105/AJPH.2007.115626

Grinstein-Weiss, M., Shanks, T. R. W., & Beverly, S. G. (2014). Family assets and child outcomes: Evidence and directions. *The Future of Children*, *24*(1), 147-170. doi: 10.1353/foc.2014.0002

Grow, H. M. G., Cook, A. J., Arterburn, D. E., Saelens, B. E., Drewnowski, A., & Lozano, P. (2010). Child obesity associated with social disadvantage of children's neighborhoods. *Social Science & Medicine*, *71*(3), 584-591. doi:10.1016/j.socscimed.2010.04.018

Halfon, N., & Hochstein, M. (2002). Life course health development: an integrated framework for developing health, policy, and research. *Milbank Quarterly*, *80*(3), 433-479. doi:10.1111/14680009.00019

Hammond, R. A. (2009). Complex systems modeling for obesity research. *Preventing Chronic Disease, 6*(3), A97. Retrieved from http://www.cdc.gov/pcd/issues/2009/jul/09_0017.htm

Harrington JW, Nguyen VQ, Paulson JF, et al. (2010) Identifying the "Tipping Point" age for overweight pediatric patients. *Clinical Pediatrics, 49*(7), 638-643. doi:10.1177/0009922809359418

Harris, J. L., Pomeranz, J. L., Lobstein, T., & Brownell, K. D. (2009). A crisis in the marketplace: how food marketing contributes to childhood obesity and what can be done. *Annual Review of Public Health*, *30*, 211-225. doi:10.1146/annurev.publhealth.031308.100304

Hawkes, C., Friel, S., Lobstein, T., & Lang, T. (2012). Linking agricultural policies with obesity and noncommunicable diseases: a new perspective for a globalising world. *Food Policy*, *37*(3), 343353. doi:10.1016/j.foodpol.2012.02.011

Herbers, J. E., Reynolds, A. J., & Chen, C. C. (2013). School mobility and developmental outcomes in young adulthood. *Development and Psychopathology*, *25*(02), 501-515. doi:10.1017/S0954579412001204

Hernández-Valero, M. A., Bustamante-Montes, L. P., Hernández, M., Halley-Castillo, E., Wilkinson, A. V., Bondy, M. L., & Olvera, N. (2012). Higher risk for obesity among Mexican– American and Mexican immigrant children and adolescents than among peers in Mexico. *Journal of Immigrant and Minority Health, 14*(4), 517-522. doi:10.1007/s10903-011-9535-9

Hillier-Brown, F. C., Bambra, C. L., Cairns, J. M., Kasim, A., Moore, H. J., & Summerbell, C. D. (2014). A systematic review of the effectiveness of individual, community and societal level interventions at reducing socioeconomic inequalities in obesity amongst children. *BMC Public Health*, *14*(1), 834. doi:10.1186/1471-2458-14-834

Hoelscher, D. M., Springer, A. E., Ranjit, N., Perry, C. L., Evans, A. E., Stigler, M., & Kelder, S. H. (2010). Reductions in child obesity among disadvantaged school children with community involvement: the Travis County CATCH Trial. *Obesity*, *18*(S1), S36-S44. doi:10.1038/oby.2009.430

Hollar, D., Lombardo, M., Lopez-Mitnik, G., Hollar, T. L., Almon, M., Agatston, A. S., & Messiah, S. E. (2010). Effective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children. *Journal of Health Care for the Poor and Underserved*, *21*(2), 93-108. doi:10.1353/hpu.0.0304

Holub, C. K., Lobelo, F., Mehta, S. M., Sánchez Romero, L. M., Arredondo, E. M., & Elder, J. P. (2014). School-Wide programs aimed at obesity among latino youth in the united states: A review of the evidence. *Journal of School Health, 84*(4), 239-246. doi:10.1111/josh.12144

Hu, F. B. (2013). Resolved: there is sufficient scientific evidence that decreasing sugar-sweetened beverage consumption will reduce the prevalence of obesity and obesity-related diseases. *Obesity Reviews*, *14*(8), 606-619. doi:10.1111/obr.12040

Huang, J., Sherraden, M., Kim, Y., & Clancy, M. (2014). Effects of Child Development Accounts on early social-emotional development: An experimental test. *JAMA Pediatrics*, *168*(3), 265-271. doi:10.1001/jamapediatrics.2013.4643

Huang, T.T., Drewnowski, A., Kumanyika, S.K., & Glass, T.A. (2009). A systems-oriented multilevel framework for addressing obesity in the 21st century. *Preventing Chronic Disease*, 6(3), 1-10. Retrieved from http://www.cdc.gov/pcd/issues/2009/jul/09_0013.htm

Institute of Medicine (US). (2012). *Accelerating progress in obesity prevention: solving the weight of the nation*. Washington, DC: National Academies Press. Retrieved from www.nap.edu

Institute of Medicine (US). (2015). *How Modeling Can Inform Strategies to Improve Population Health: Workshop Summary*. Washington, DC: National Academies Press, prepublication copy: uncorrected proofs. Retrieved from www.nap.edu

Isaacs, J. B. (2012). The ongoing impact of foreclosures on children. Washington, DC: Brookings Institution, March, 201(2). Retrieved from http://brook.gs/1LmJrCa

Ishizawa, H., & Jones, A. (2015). Immigrant neighborhood concentration, acculturation, and obesity among young adults. *Journal of Urban Affairs.* doi: 10.1111/juaf.12208

Johnson, T., Weed, L. D., & Touger-Decker, R. (2012). School-based interventions for overweight and obesity in minority school children. *The Journal of School Nursing*, *28*(2), 116-123. doi:10.1177/1059840511426147

Johnston, L.M., Matteson, C.L., & Finegood, D.T. (2014). Systems science and obesity policy: A novel framework for analyzing and rethinking population-level planning. *American Journal of Public Health*, 104, 1270–1278. doi:10.2105/AJPH.2014.301884

Kaiser, K. A., Cofield, S. S., Fontaine, K. R., Glasser, S. P., Thabane, L., Chu, R., ... & Allison, D. B. (2012). Is funding source related to study reporting quality in obesity or nutrition randomized control trials in top-tier medical journals? *International Journal of Obesity*, *36*(7), 977-981. doi:10.1038/ijo.2011.207

Katan, M. B., & Ludwig, D. S. (2010). Extra calories cause weight gain—but how much? *Journal of the American Medical Association, 303*(1), 65-66. doi:10.1001/jama.2009.1912.

Kaufman-Shriqui, V., Fraser, D., Friger, M., Bilenko, N., Vardi, H., Abu-Saad, K.. . Shahar, D. R. (2013). Factors associated with

childhood overweight and obesity among acculturated and new immigrants. *Ethnicity & Disease, 23*(3), 329. Retrieved from http://bit.ly/1LHX9TS

Kershaw, K. N., Albrecht, S. S., & Carnethon, M. R. (2013). Racial and ethnic residential segregation, the neighborhood socioeconomic environment, and obesity among Blacks and Mexican Americans. *American Journal of Epidemiology*, *177*(4), 299-309. doi:10.1093/aje/kws372

Kershaw, K. N., & Albrecht, S. S. (2014). Metropolitan-level ethnic residential segregation, racial identity, and body mass index among US Hispanic adults: a multilevel cross-sectional study. *BMC Public Health*, *14*(1), 283. doi:10.1186/1471-2458-14-283

Khalak, R., Cummings, J., & Dexter, S. (2015). Maternal obesity: significance on the preterm neonate. *International Journal of Obesity*, *39*(10), 1433-1436 4p. doi:10.1038/ijo.2015.107

Khambalia, A. Z., Dickinson, S., Hardy, L. L., Gill, T., & Baur, L. A. (2012). A synthesis of existing systematic reviews and meta-analyses of school-based behavioural interventions for controlling and preventing obesity. *Obesity Reviews*, *13*(3), 214-233. doi:10.1111/j.1467789X.2011.00947.x

Khlat, M., Jusot, F., & Ville, I. (2009). Social origins, early hardship and obesity: a strong association in women, but not in men? *Social Science and Medicine*, 68(9), 1692–1699. doi:10.1016/j.socscimed.2009.02.024

Kimbro, R. T., & Rigby, E. (2010). Federal food policy and childhood obesity: a solution or part of the problem? *Health Affairs*, 29(3), 411-418. doi:10.1377/hlthaff.2009.0731

Klerman, J., Bartlett, S., Wilde, P., & Olsho, L. (2014). The short-run impact of the healthy incentives pilot program on fruit and vegetable intake. *American Journal of Agricultural Economics, 96*(5), 1372-1382. doi:10.1093/ajae/aau023

Knowlden, A. P., & Sharma, M. (2013). Systematic review of school-based obesity interventions targeting African American and Hispanic children. *Journal of Health Care for the Poor and Underserved*, *24*(3), 1194-1214. doi:10.1353/hpu.2013.0129

Koebnick, C., Mohan, Y. D., Li, X., & Young, D. R. (2015). Secular trends of overweight and obesity in young southern Californians 2008-2013. *The Journal of Pediatrics*, In-press. doi:10.1016/j.jpeds.2015.08.039

Kraak, V. I., Story, M., & Wartella, E. A. (2012). Government and school progress to promote a healthful diet to American children and adolescents: a comprehensive review of the available evidence. *American Journal of Preventive Medicine*, *42*(3), 250-262. doi:10.1016/j.amepre.2011.10.025

Kramer, K., Schwarte, L., Lafleur, M., & Williams, J. D. (2013). Targeted marketing of junk food to ethnic minority youth: fighting back with legal advocacy and community engagement. *Advances in Communication Research to Reduce Childhood Obesity*, 389-405. doi:10.1007/978-14614-5511-0_18

Kristensen, A. H., Flottemesch, T. J., Maciosek, M. V., Jenson, J., Barclay, G., Ashe, M., ... & Brownson, R. C. (2014). Reducing childhood obesity through US federal policy: a microsimulation analysis. *American Journal of Preventive Medicine*, *47*(5), 604-612. doi:10.1016/j.amepre.2014.07.011

Kuh, D., Ben-Shlomo, Y., Lynch, J., Hallqvist, J., & Power, C. (2003). Life course epidemiology. *Journal of Epidemiology and Community Health*, *57*(10), 778-783. doi:10.1136/jech.57.10.778

Kumanyika, S., Grier, S. A., Lancaster, K., & Lassiter, V. (2011). Impact of sugar-sweetened beverage consumption on Black American's health. *Research Brief. African American Collaborative Obesity Research Network, Philadelphia, PA*. Retrieved from http://www.aacorn.org/RepoRese-2542.html

Kumanyika, S., Swank, M., Stachecki, J., Whitt-Glover, M. C., & Brennan, L. K. (2014). Examining the evidence for policy and environmental strategies to prevent childhood obesity in black communities: new directions and next steps. *Obesity Reviews*, *15*(S4), 177-203. doi:10.1111/obr.12206

Kunkel, D., Castonguay, J. S., & Filer, C. R. (2015). Evaluating industry self-regulation of food marketing to children. *American Journal of Preventive Medicine, 49*(2), 181-187. doi:10.1016/j.amepre.2015.01.027

Kunkel, D., Mastro, D., Ortiz, M., & McKinley, C. (2013). Food marketing to children on U.S. Spanish-language television. *Journal of Health Communication*, *18*(9), 1084-1096. doi:10.1080/10810730.2013.768732

Kushel, M. B., Gupta, R., Gee, L., & Haas, J. S. (2006). Housing instability and food insecurity as barriers to health care among low--income Americans. *Journal of General Internal Medicine*, *21*(1), 71-77. doi:10.1111/j.1525-1497.2005.00278.x

Lamboglia, C. M. G. F., Silva, V. T. B. L. D., Vasconcelos Filho, J. E. D., Pinheiro, M. H. N. P., Munguba, M. C. D. S., Silva Jœnior, F. V. I., ... & Silva, C. A. B. D. (2013). Exergaming as a strategic tool in the fight against childhood obesity: A systematic review. *Journal of Obesity*, *2013*, 1-8. doi:10.1155/2013/438364

Landrine, H., & Corral, I. (2009). Separate and unequal: residential segregation and black health disparities. *Ethnicity & Disease*, *19*(2), 179-184. Retrieved from www.ishib.org/journal/19-2/ethn19-02-179.pdf

Larson, N., & Story, M. (2015). Barriers to equity in nutritional health for US children and adolescents: a review of the literature. *Current Nutrition Reports*, *4*(1), 102-110. doi:10.1007/s13668-014-0116-0

Larson, N., Ward, D. S., Neelon, S. B., & Story, M. (2011). What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *Journal of the American Dietetic Association*, *111*(9), 1343-1362. doi:10.1016/j.jada.2011.06.007

Laws, R., Campbell, K. J., van der Pligt, P., Russell, G., Ball, K., Lynch, J., ... & Denney-Wilson, E. (2014). The impact of interventions to prevent obesity or improve obesity related behaviours in children (0-5 years) from socioeconomically disadvantaged and/or indigenous families: a systematic review. *BMC Public Health*, *14*(1), 779. doi:10.1186/1471-2458-14-779

Lee, H. (2011). Inequality as an explanation for obesity in the United States. *Sociology Compass*, *5*(3), 215-232. doi: 10.1111/j.1751-9020.2010.00355.x

Lemas, D. J., Brinton, J. T., Shapiro, A. L. B., Glueck, D. H., Friedman, J. E., & Dabelea, D. (2015). Associations of maternal weight status prior and during pregnancy with neonatal cardiometabolic markers at birth: the Healthy Start study. *International Journal of Obesity*, *39*(10), 1437-1442. doi:10.1038/ijo.2015.109

Lesser, L. I., Ebbeling, C. B., Goozner, M., Wypij, D., & Ludwig, D. S. (2007). Relationship between funding source and conclusion among nutrition-related scientific articles. *PLOS Medicine*, *4*(1), 41-46. doi:10.1371/journal.pmed.0040005

Levine, J. A. (2011). Poverty and obesity in the U.S. *Diabetes*, *60*(11), 2667-2668. doi:10.2337/db11-1118

Long, M. W., Gortmaker, S. L., Ward, Z. J., Resch, S. C., Moodie, M. L., Sacks, G.. . Claire Wang, Y. (2015). Cost effectiveness of a sugar-sweetened beverage excise tax in the U.S. *American Journal of Preventive Medicine, 49*(1), 112-123. doi:10.1016/j.amepre.2015.03.004

Ludwig, J., Duncan, G. J., Gennetian, L. A., Katz, L. F., Kessler, R. C., Kling, J. R., & Sanbonmatsu, L. (2013). Long-Term Neighborhood Effects on Low-Income Families: Evidence from Moving to Opportunity. *American Economic Review*, *103*(3), 226-231. doi:10.1257/aer.103.3.226

Ludwig, J., Sanbonmatsu, L., Gennetian, L., Adam, E., Duncan, G. J., Katz, L. F., ... & McDade, T. W. (2011). Neighborhoods, obesity, and diabetes—a randomized social experiment. *New England Journal of Medicine*, *365*(16), 1509-1519. doi:10.1056/NEJMsa1103216

Lumeng, J. C., Kaciroti, N., & Frisvold, D. E. (2010). Changes in body mass index z score over the course of the academic year among children attending Head Start. *Academic pediatrics*, *10*(3), 179 186. doi:10.1016/j.acap.2010.01.008

Lumeng, J. C., Taveras, E. M., Yanovski, S. Z., & Birch, L. (2015). Prevention of obesity in infancy and early childhood: A National Institutes of Health Workshop. *JAMA Pediatrics, 169*(5), 484-490. doi:10.1001/jamapediatrics.2014.3554

Lyn, R., Aytur, S., Davis, T. A., Eyler, A. A., Evenson, K. R., Chriqui, J. F.. . Brownson, R. C. (2013). Policy, systems, and environmental approaches for obesity prevention: A framework to inform local and state action. *Journal of Public Health Management and Practice, 19*(3 Suppl 1), S23-S33. Retrieved from http://bit.ly/20hun4f

Ma, C. T., Gee, L., & Kushel, M. B. (2008). Associations between housing instability and food insecurity with health care access in low-income children. *Ambulatory Pediatrics*, *8*(1), 50-57. doi:10.1016/j.ambp.2007.08.004

Macintyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: how can we conceptualise, operationalise and measure them? *Social Science & Medicine*, *55*(1), 125-139. doi:10.1016/S0277-9536(01)00214-3

Magnusson, M. B., Sjšberg, A., Kjellgren, K. I., & Lissner, L. (2011). Childhood obesity and prevention in different socio-economic contexts. *Preventive Medicine*, *53*(6), 402-407. doi:10.1016/j.ypmed.2011.09.019

Malik, V. S., & Hu, F. B. (2015). Fructose and Cardiometabolic Health: What the Evidence From Sugar-Sweetened Beverages Tells Us. *Journal of the American College of Cardiology*, *66*(14), 1615-1624. doi:10.1016/j.jacc.2015.08.025

Malik, V. S., Pan, A., Willett, W. C., & Hu, F. B. (2013). Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *The American Journal of Clinical Nutrition*, *98*(4), 1084-1102. doi:10.3945/ajcn.113.058362

Martin, R., Patel, R., Foo, Y., Smith, G., Palmer, T., Kramer, M., & ... Gusina, N. (2013). Effects of promoting longer-term and exclusive breastfeeding on adiposity and insulin-like growth factor-I at age 11.5 years: A randomized trial. *Journal of the American Medical Association, 309*(10), 10051013. doi:10.1001/jama.2013.167

Mayne, S. L., Auchincloss, A. H., & Michael, Y. L. (2015). Impact of policy and built environment changes on obesity-related outcomes: a systematic review of naturally occurring experiments. *Obesity Reviews*, *16*(5), 362-375. doi:10.1111/obr.12269

McCrory, C., & Layte, R. (2012). Breastfeeding and risk of overweight and obesity at nine-years of age. *Social Science & Medicine, 75*(2), 323-330. doi:10.1016/j.socscimed.2012.02.048

McGill, R., Anwar, E., Orton, L., Bromley, H., Lloyd-Williams, F., Martin, O., ... & Capewell, S. (2015). Are interventions to promote healthy eating equally effective for all? Systematic review of socioeconomic inequalities in impact. *BMC Public Health*, *15*(1), 457. doi:10.1186/s12889-0151781-7

Mialon, M., Swinburn, B., & Sacks, G. (2015). A proposed approach to systematically identify and monitor the corporate political activity of the food industry with respect to public health using publicly available information. *Obesity Reviews, 16*(7), 519-530. doi:10.1111/obr.12289

Mikailova, M. (2014). Advertising and childhood obesity: the role of the federal government in limiting children's exposure to unhealthy advertisements. *Fed. Comm. LJ*, *66*, 327. Retrieved from http://bit.ly/1Q13JYA

Molitor, F., Sugerman, S., Yu, H., Biehl, M., Aydin, M., Levy, M., & Ponce, N. A. (2015). Reach of Supplemental Nutrition Assistance Program–Education (SNAP–Ed) interventions and nutrition and physical activity-related outcomes, California, 2011–2012. *Preventing Chronic Disease*, *12*, E33. http://doi.org/10.5888/pcd12.140449

Monasta, L., Cattaneo, A., Batty, G. D., Lutje, V., Ronfani, L., Brug, J., & Lenthe, F. J. (2010). Early-life determinants of overweight and obesity: A review of systematic reviews. *Obesity Reviews, 11*(10), 695-708. doi:10.1111/j.1467-789X.2010.00735.x

Mosisa, A., & Hipple, S. (2006). Trends in labor force participation in the United States. *Monthly Labor Review, 129*, 35-57. Retrieved from http://1.usa.gov/1XlUfHE

Myers, E. F., Parrott, J. S., Cummins, D. S., & Splett, P. (2011). Funding source and research report quality in nutrition practice-related research. *PloS One*, *6*(12), e28437-e28437. doi:10.1371/journal.pone.0028437

Nguyen, B., Kornman, K. P., & Baur, L. A. (2011). A review of electronic interventions for prevention and treatment of overweight and obesity in young people. *Obesity Reviews*, *12*(5), e298e314. doi:10.1111/j.1467-789X.2010.00830.x

Nollen, N. L., Mayo, M. S., Carlson, S. E., Rapoff, M. A., Goggin, K. J., & Ellerbeck, E. F. (2014). Mobile technology for obesity prevention: a randomized pilot study in racial-and ethnic-minority girls. *American Journal of Preventive Medicine*, *46*(4), 404-408. doi:10.1016/j.amepre.2013.12.011

Novick, L. F. (Ed.). (2015). Evaluation of the Healthy Kids, Healthy Communities National. *Journal of Public Health Management and Practice, 21*(Supp 3) S1-S136. Retrieved from http://journals.lww.com/jphmp/toc/2015/05001

O'Campo, P. (2013). Harder than rocket science? The science of designing and implementing strong family-friendly policies. In N. S. Landale, S. M. McHale, & A. Booth (Eds.), *Families and Child Health*. New York, NY: Springer.

O'Conner, A. (2015, September 28). Coke spends lavishly on pediatricians and dietitians. *The New York Times*. Retrieved from http://nyti.ms/1M1Kolb

Ogden, C.L., Carroll, M.D., Fryar, C.D., Flegal, K.M. (2015) Prevalence of obesity among adults and youth: United States, 2011–2014. *NCHS Data Brief*, No. 219. Retrieved from http://1.usa.gov/1MEjJLq

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association*, *311*(8), 806814. doi:10.1001/jama.2014.732

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *Journal of the American Medical Association*, *307*(5), 483-490. doi:10.1001/jama.2012.40

Olds, T., Maher, C., Zumin, S., PŽneau, S., Lioret, S., Castetbon, K., & Summerbell, C. (2011). Evidence that the prevalence of childhood overweight is plateauing: data from nine countries. *International journal of Pediatric Obesity*, *6*(5-6), 342-360. doi:10.3109/17477166.2011.605895

Orr, A. (2003). Black-white differences in achievement: The importance of wealth. *Sociology of Education*, 76(4), 281-304. doi:10.2307/1519867

Otero, G., Pechlaner, G., Liberman, G., & GŸrcan, E. (2015). The neoliberal diet and inequality in the United States. *Social Science & Medicine*, *142*, 47-55. doi:10.1016/j.socscimed.2015.08.005

Peirson, L., Fitzpatrick-Lewis, D., Morrison, K., Ciliska, D., Kenny, M., Ali, M. U., & Raina, P. (2015). Prevention of overweight and obesity in children and youth: a systematic review and metaanalysis. *Canadian Medical Association Open Access Journal*, *3*(1), E23-E33. doi:10.9778/cmajo.20140053

Pooler, J. (2015, November). Positive impact of a nutrition education program for low-income adults on food resource management skills and self-efficacy. In *143rd APHA Annual Meeting and Exposition,* 334226 *(October 31-November 4, 2015)*. APHA.

Poti, J. M., & Popkin, B. M. (2011). Trends in energy intake among US children by eating location and food source, 1977-2006. *Journal of the American Dietetic Association, 111*(8), 1156-1164. doi:10.1016/j.jada.2011.05.007

Powell, L. M., Chriqui, J. F., Khan, T., Wada, R., & Chaloupka, F. J. (2013). Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand and body weight outcomes. *Obesity Reviews*, *14*(2), 110-128. doi:10.1111/obr.12002

Powell, L. M., Wada, R., & Kumanyika, S. K. (2014). Racial/ethnic and income disparities in child and adolescent exposure to food and beverage television ads across the U.S. media markets. *Health & Place, 29*, 124-131. doi:10.1016/j.healthplace.2014.06.006

Pudrovska, T., Logan, E. S., & Richman, A. (2014). Early-life social origins of later-life body weight: The role of socioeconomic status and health behaviors over the life course. *Social Science Research*, *46*, 59-71. doi:10.1016/j.ssresearch.2014.02.007

Qian, Y., Nayga Jr, R. M., Thomsen, M. R., & Rouse, H. (2015). The effect of the Fresh Fruit and Vegetable Program on childhood obesity. *Applied Economic Perspectives and Policy*, 0(0), 1–16. doi:10.1093/aepp/ppv017

Reat, A., Crixell, S., Friedman, B., & Bank, J. (2015). Comparison of food intake among infants and toddlers participating in a south central Texas WIC program reveals some improvements after wic package changes. *Maternal & Child Health Journal*, *19*(8), 1834-1841 8p. doi:10.1007/s10995-015-1697-y

Reid, K. W., Vittinghoff, E., & Kushel, M. B. (2008). Association between the level of housing instability, economic standing and health care access: a meta-regression. *Journal of Health Care for the Poor and Underserved*, *19*(4), 1212-1228. doi:10.1353/hpu.0.0068

Robinson, L. E., Webster, E. K., Whitt-Glover, M. C., Ceaser, T. G., & Alhassan, S. (2014). Effectiveness of pre-school and school-based interventions to impact weight-related behaviours in African American children and youth: A literature review. *Obesity Reviews, 15*(S4), 5-25. doi:10.1111/obr.12208

Rossem, L., Hafkamp-De Groen, E., Mackenbach, J., Jaddoe, V., Raat, H., & Hofman, A. (2014). The role of early life factors in the development of ethnic differences in growth and overweight in preschool children: A prospective birth cohort. *BMC Public Health, 14*(1), 722-722. doi:10.1186/1471-2458-14-722

Rossen, L. M., & Schoendorf, K. C. (2012). Measuring health disparities: trends in racial– ethnic and socioeconomic disparities in obesity among 2-to 18-year old youth in the United States, 2001– 2010. *Annals of Epidemiology*, *22*(10), 698-704. doi:10.1016/j.annepidem.2012.07.005

Rossen, L. M., & Talih, M. (2014). Social determinants of disparities in weight among us children and adolescents. *Annals of Epidemiology*, *24*(10), 705-713. doi:10.1016/j.annepidem.2014.07.010

Rudd Center for Food Policy & Obesity. (2015). *Food advertising targeted to Hispanic and Black youth: Contributing to health disparities.* Retrieved from http://bit.ly/1PVH8xL

Ryabov, I. (2015). The role of residential segregation in explaining racial gaps in childhood and adolescent obesity. *Youth & Society*. doi: 0044118X15607165

Saelens, B. E., Sallis, J. F., Frank, L. D., Couch, S. C., Zhou, C., Colburn, T., ... & Glanz, K. (2012). Obesogenic neighborhood environments, child and parent obesity: the Neighborhood Impact on Kids study. *American Journal of Preventive Medicine*, *42*(5), e57-e64. doi:10.1016/j.amepre.2012.02.008

Sallis, J.F. (2015). Advancing systems thinking through the Healthy Kids, Healthy Communities evaluation. *Journal of Public Health Management and Practice, 21*(Supp 3), S88. Retrieved from http://journals.lww.com/jphmp/toc/2015/05001

Sanbonmatsu, L., Ludwig, J., Katz, L.F.,…& Lindau, S. T. (2011). *Moving to Opportunity for Fair Housing Demonstration Program: Final Impacts Evaluation*. Report prepared by the National Bureau of Economic Research Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research. Retrieved from http://bit.ly/1LHVFca

Sánchez-Vaznaugh, E. V., Sánchez, B. N., Crawford, P. B., & Egerter, S. (2015). Association between competitive food and beverage policies in elementary schools and childhood overweight/obesity trends: differences by neighborhood socioeconomic resources. *JAMA Pediatrics*, *169*(5), e150781-e150781. doi:10.1001/jamapediatrics.2015.0781

Sekhobo, J. P., Edmunds, L. S., Dalenius, K., Jernigan, J., Davis, C. F., Giddings, M.. . Kettel Khan, L. (2014). Neighborhood disparities in prevalence of childhood obesity among low-income children before and after implementation of New York City child care regulations. *Preventing Chronic Disease, 11*, E181.. doi:10.5888/pcd11.140152

Shafai, T., Mustafa, M., & Hild, T. (2014). Promotion of exclusive breastfeeding in low-income families by improving the WIC food package for breastfeeding mothers. *Breastfeeding Medicine*, *9*(8), 375-376. doi:10.1089/bfm.2014.0062

Shanks, T. R. W. (2007). The impacts of household wealth on child development. *Journal of Poverty*, *11*(2), 93-116. doi: 10.1300/J134v11n02_05.

Sharma, A., Grummer-Strawn, L., Dalenius, K., Galuska, D., Anandappa, M., Borland, E., Mackintosh, H., & Smith R. (2009). Obesity prevalence among low-income, preschool-aged children—United States, 1998–2008. *Morbidity and Mortality Weekly Report*, *58*(28), 769-773. Retrieved from http://1.usa.gov/1Wp4s5N

Shirley, K., Rutfield, R., Hall, N., Fedor, N., McCaughey, V. K., & Zajac, K. (2015). Combinations of obesity prevention strategies in US elementary schools: A critical review. *The Journal of Primary Prevention*, *36*(1), 1-20. doi:10.1007/s10935-014-0370-3

Silveira, J. A. C. D., Taddei, J. A. D. A. C., Guerra, P. H., & Nobre, M. R. C. (2013). The effect of participation in school-based nutrition education interventions on body mass index: A meta-analysis of randomized controlled community trials. *Preventive Medicine*, *56*(3), 237-243. doi:10.1016/j.ypmed.2013.01.011

Singh A. S., Mulder C., Twisk J. W., van Mechelen W., Chinapaw M. J. (2008). Tracking of childhood overweight into adulthood: a systematic review of the literature. *Obesity Reviews,* 9 (5):474-488. doi:10.1111/j.1467-789X.2008.00475.x

Singh, G. K., Kogan, M. D., & Stella, M. Y. (2009). Disparities in obesity and overweight prevalence among US immigrant children and adolescents by generational status. *Journal of Community Health*, *34*(4), 271-281. doi:10.1007/s10900-009-9148-6

Singh, G. K., Siahpush, M., & Kogan, M. D. (2010). Rising social inequalities in US childhood obesity, 2003–2007. *Annals of Epidemiology*, 20(1), 40-52. doi:10.1016/j.annepidem.2009.09.008

Singh, G. K., Yu, S. M., & Kogan, M. D. (2012). Health, chronic conditions, and behavioral risk disparities among US immigrant children and adolescents. *Public Health Reports (Washington, DC: 1974)*, *128*(6), 463-479. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/24179258

Skinner, A. C., & Skelton, J.A. (2014). Prevalence and trends in obesity and severe obesity among children in the United States, 1999-2012. *JAMA Pediatrics*, *168*(6), 561-566. doi:10.1001/jamapediatrics.2014.21

Slusser, W. M., Sharif, M. Z., Erausquin, J. T., Kinsler, J. J., Collin, D., & Prelip, M. L. (2013). Improving overweight among at-risk minority youth: Results of a pilot intervention in after-school programs. *Journal of Health Care for the Poor and Underserved*, *24*(2), 12-24. doi:10.1353/hpu.2013.0111

Smith, J. J., Morgan, P. J., Plotnikoff, R. C., Dally, K. A., Salmon, J., Okely, A. D., ... & Lubans, D. R. (2014). Smart-phone obesity prevention trial for adolescent boys in low-income communities: the ATLAS RCT. *Pediatrics*, *134*(3), e723-e731. doi:10.1542/peds.2014-1012

Smith, L., Ng, S., & Popkin, B. (2013). Trends in US home food preparation and consumption: Analysis of national nutrition surveys and time use studies from 1965-1966 to 2007-2008. *Nutrition Journal, 12*(1), 45-45. doi:10.1186/1475-2891-12-45

Smithers, L. G., Kramer, M. S., & Lynch, J. W. (2015). Effects of breastfeeding on obesity and intelligence: causal insights from different study designs. *JAMA Pediatrics*, *169*(8), 707-708. doi:10.1001/jamapediatrics.2015.0175

Sonneville, K. R., Long, M. W., Ward, Z. J., Resch, S. C., Wang, Y. C., Pomeranz, J. L., ... & Gortmaker, S. L. (2015). BMI and healthcare cost impact of eliminating tax subsidy for advertising unhealthy food to youth. *American Journal of Preventive Medicine*, *49*(1), 124-134. doi:10.1016/j.amepre.2015.02.026

Specter, M. (2015). Freedom from fries: can fast food be good for you? *The New Yorker*, November 2. Retrieved from http://nyr.kr/1R9KLxq

Stevens, C. (2010). Obesity prevention interventions for middle school-age children of ethnic minority: a review of the literature. *Journal for Specialists in Pediatric Nursing*, *15*(3), 233-243 11p. doi:10.1111/j.1744-6155.2010.00242.x

Sturm, R., & An, R. (2014). Obesity and economic environments. *CA: A Cancer Journal for Clinicians*, *64*(5), 337-350. doi:10.3322/caac.21237

Suarez-Balcazar, Y., Friesema, J., & Lukyanova, V. (2013). Culturally competent interventions to address obesity among African American and Latino children and youth. *Occupational Therapy in Health Care*, *27*(2), 113-128. doi:10.3109/07380577.2013.785644

Swinburn, B. A., Sacks, G., Hall, K. D., McPherson, K., Finegood, D. T., Moodie, M. L., & Gortmaker, S. L. (2011). The global obesity pandemic: shaped by global drivers and local environments. *The Lancet*, *378* (9793), 804-814. doi: http://dx.doi.org/10.1016/S01406736(11)60813-1

Swinburn, B., Sacks, G., & Ravussin, E. (2009). Increased food energy supply is more than sufficient to explain the US epidemic of obesity. *The American Journal of Clinical Nutrition, 90*(6), 1453-1456. doi:10.3945/ajcn.2009.28595

Thompson, A. L., & Bentley, M. E. (2013). The critical period of infant feeding for the development of early disparities in obesity. *Social Science & Medicine, 97*, 288-296. doi:10.1016/j.socscimed.2012.12.007

Thow, A. M., Downs, S., & Jan, S. (2014). A systematic review of the effectiveness of food taxes and subsidies to improve diets: Understanding the recent evidence. *Nutrition Reviews*, *72*(9), 551565. doi:10.1111/nure.12123

Thury, C., & de Matos, C. M. (2015). Prevention of childhood obesity: a review of the current guidelines and supporting evidence. *South Dakota Medicine: The Journal Of The South Dakota State Medical Association, special issue*, 18-23.

Tippett, R., Jones-DeWeever, A., Rockeymoore, M., Hamilton, D., & Darity, W. (2014). Beyond Broke: Why Closing the Racial Wealth Gap is a Priority for National Economic Security. *Report prepared by Center for Global Policy Solutions and The Research Network on Ethnic and Racial Inequality at Duke University with funds provided by the Ford Foundation*. Retrieved from http://bit.ly/1I1YztU

Tovar, A., Renzaho, A. M., Guerrero, A. D., Mena, N., & Ayala, G. X. (2014). A systematic review of obesity prevention intervention studies among immigrant populations in the US. *Current Obesity Reports*, *3*(2), 206-222. doi:10.1007/s13679-014-0101-3 US Department of Agriculture, Economic Research Service. (2015). Food availability and consumption. Retrieved from http://1.usa.gov/1N3wjYC

United States Federal Trade Commission. (2012). *A review of food marketing to children and adolescents: Follow-up report*. Washington, D.C.: Federal Trade Commission. Retrieved from https://www.ftc.gov/reports/review-food-marketing-children-adolescents-follow-report

Van Lippevelde, W., Verloigne, M., De Bourdeaudhuij, I., Brug, J., Bjelland, M., Lien, N., & Maes, L. (2012). Does parental involvement make a difference in school-based nutrition and physical activity interventions? A systematic review of randomized controlled trials. *International Journal of Public Health*, *57*(4), 673-678. doi:10.1007/s00038-012-0335-3

Vornovitsky, M., Gottschalck, A., & Smith, A. (2014). Distribution of household wealth in the U.S.: 2000 to 2011. Washington, DC: United States Census Bureau. Retrieved from http://bit.ly/1I3NbxJ

Wallinga, D. (2010). Agricultural policy and childhood obesity: a food systems and public health commentary. *Health Affairs*, *29*(3), 405-410. doi:10.1377/hlthaff.2010.0102

Wallinga, D., Schoonover, H., & Muller, M. (2009). Considering the contribution of US agricultural policy to the obesity epidemic: overview and opportunities. *Journal of Hunger & Environmental Nutrition*, *4*(1), 3-19. doi:10.1080/19320240802706817

Wang, Y., & Beydoun, M. A. (2007). The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and metaregression analysis. *Epidemiologic Reviews*, 29(1), 6-28. doi: 10.1093/epirev/mxm007

Wang, Y., Cai, L., Wu, Y., Wilson, R. F., Weston, C., Fawole, O., ... & Segal, J. (2015). What childhood obesity prevention programmes work? A systematic review and meta--analysis. *Obesity Reviews*, 547-565. doi:10.1111/obr.12277

Wang, Y., Gortmaker, S. L., & Taveras, E. M. (2011). Trends and racial/ethnic disparities in severe obesity among US children and

adolescents, 1976–2006. *International journal of Pediatric Obesity*, 6(1), 12-20. doi:10.3109/17477161003587774

Wang, Y., Xue, H., X., Esposito, L., Bar-Yam, Y., & Huang, T.K. (2014). Applications of complex systems science in obesity and non-communicable chronic disease research. *Advances in Nutrition, 5*(5), 574-577. doi:10.3945/an.114.006650

Waters, E., de Silva-Sanigorski, A., Hall, B. J., Brown, T., Campbell, K. J., Gao, Y., ... & Summerbell, C. D. (2011). Interventions for preventing obesity in children. *The Cochrane Database of Systematic Reviews,* (12). doi: 10.1002/14651858.CD001871.pub3

Wen, X., Gillman, M. W., Rifas-Shiman, S. L., Sherry, B., Kleinman, K., & Taveras, E. M. (2012). Decreasing prevalence of obesity among young children in Massachusetts from 2004 to 2008. *Pediatrics*, *129*(5), 823-831. doi:10.1542/peds.2011-1833

Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine*, 337(13):869–873. doi:10.1056/NEJM199709253371301

White House Task Force on Childhood Obesity. (2010). *Solving the problem of childhood obesity in a generation: report to the president*. Washington, D.C.: Executive Office of the President of the United States. Retrieved from http://www.letsmove.gov/sites/letsmove.gov/files/

Whittemore, R., Chao, A., Popick, R., & Grey, M. (2013). School-based internet obesity prevention programs for adolescents: a systematic literature review. *The Yale Journal of Biology and Medicine*, *86*(1), 49-62. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3584495/

Whitt-Glover, M. C., & Kumanyika, S. K. (2009). Systematic review of interventions to increase physical activity and physical fitness in African-Americans. *American Journal of Health Promotion,* 23(6), S33-S56. doi:10.4278/ajhp.070924101

Wickrama, K. T., Wickrama, K. A., & Bryant, C. M. (2006). Community influence on adolescent obesity: Race/ethnic differences. *Journal of Youth and Adolescence*, *35*(4), 641-651. doi:10.1007/s10964-006-9050-9

Wilde, P., Morgan, E., Roberts, J., Schpok, A., & Wilson, T. (2012). Relationship between funding sources and outcomes of obesity-related research. *Physiology & Behavior, 107*(1), 172. doi:10.1016/j.physbeh.2012.05.004

Williams, D. R., & Collins, C. (2001). Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Reports*, *116*(5), 404-416. doi:10.1016/S0033-3549(04)50068-7

Williams, D. R., & Jackson, P. B. (2005). Social sources of racial disparities in health. *Health Affairs*, *24*(2), 325-334. doi:10.1377/hlthaff.24.2.325

Williams, N., Dooyema, C. A., Foltz, J. L., Belay, B., & Blanck, H. M. (2015). The childhood obesity research demonstration project: A team approach for supporting a multisite, multisector intervention. *Childhood Obesity*, *11*(1), 104-108. doi:10.1089/chi.2014.0063

Wodtke, G. T., Harding, D. J., & Elwert, F. (2011). Neighborhood effects in temporal perspective: the impact of long-term exposure to concentrated disadvantage on high school graduation. *American Sociological Review*, *76*(5), 713-736. doi:10.1177/0003122411420816

Wolfenden, L., Wyse, R., Nichols, M., Allender, S., Millar, L., & McElduff, P. (2014). A systematic review and meta-analysis of whole of community interventions to prevent excessive population weight gain. *Preventive Medicine*, *62*, 193-200. doi:10.1016/j.ypmed.2014.01.031

Wright, D. R., Kenney, E. L., Giles, C. M., Long, M. W., Ward, Z. J., Resch, S. C., ... & Cradock, A. L. (2015). Modeling the cost effectiveness of child care policy changes in the US. *American Journal of Preventive Medicine*, *49*(1), 135-147. doi:10.1016/j.amepre.2015.03.016

Yan, J., Liu, L., Zhu, Y., Huang, G., & Wang, P. P. (2014). The association between breastfeeding and childhood obesity: A meta-anal-

ysis. *BMC Public Health, 14*(1), 1267-1267. doi:10.1186/14712458-14-1267

Yancey, A. K., Cole, B. L., Brown, R., Williams, J. D., Hillier, A., Kline, R. S., ... & McCarthy, W. J. (2009). A cross-sectional prevalence study of ethnically targeted and general audience outdoor obesity-related advertising. *Milbank quarterly*, *87*(1), 155-184. doi:10.1111/j.14680009.2009.00551.x

Yildirim, M., Stralen, M. M., Chinapaw, M. J., Brug, J., Mechelen, W., Twisk, J. W., & Velde, S. J. (2011). For whom and under what circumstances do school-based energy balance behavior interventions work? Systematic review on moderators. *International journal of Pediatric Obesity*, *6*(Part2), e46-e57. doi:10.3109/17477166.2011.566440

Zhou, Y. E., Emerson, J. S., Levine, R. S., Kihlberg, C. J., & Hull, P. C. (2014). Childhood obesity prevention interventions in childcare settings: systematic review of randomized and nonrandomized controlled trials. *American Journal of Health Promotion*, *28*(4), e92-e103. doi:10.4278/ajhp.121129-LIT-579

Endnotes

[1] Robinson, L. E., Webster, E. K., Whitt-Glover, M. C., Ceaser, T. G., & Alhassan, S. (2014). Effectiveness of pre-school-and school--based interventions to impact weight-related behaviours in African American children and youth: A literature review. *Obesity Reviews, 15*(S4), 5-25.

[2] Holub, C. K., Lobelo, F., Mehta, S. M., Sanchez Romero, L. M., Arredondo, E. M., & Elder, J. P. (2014). School-Wide programs aimed at obesity among Latino youth in the United States: A review of the evidence. *Journal of School Health, 84*(4), 239-246. doi:10.1111/josh.12144

[3] Johnson, T., Weed, L. D., & Touger-Decker, R. (2012). School-based interventions for overweight and obesity in minority school children. *The Journal of School Nursing*, *28*(2), 116-123. doi:10.1177/1059840511426147

[4] Knowlden, A. P., & Sharma, M. (2013). Systematic review of school-based obesity interventions targeting African American and Hispanic children. *Journal of Health Care for the Poor and Underserved*, *24*(3), 1194-1214. doi:10.1353/hpu.2013.0129

[5] Qian, Y., Nayga Jr, R. M., Thomsen, M. R., & Rouse, H. (2015). The effect of the Fresh Fruit and Vegetable Program on childhood obesity. *Applied Economic Perspectives and Policy*, 0(0), 1–16. doi:10.1093/aepp/ppv017

[6] Sanchez-Vaznaugh, E. V., Sánchez, B. N., Crawford, P. B., & Egerter, S. (2015). Association between competitive food and beverage policies in elementary schools and childhood overweight/obesity trends: differences by neighborhood socioeconomic resources. *JAMA Pediatrics*, *169*(5), e150781-e150781. doi:10.1001/jamapediatrics.2015.0781

[7] Bleich, S. N., Segal, J., Wu, Y., Wilson, R., & Wang, Y. (2013). Systematic review of community-based childhood obesity prevention studies. *Pediatrics*, *132*(1), e201-e210. doi:10.1542/peds.2013-0886

[8] Wolfenden, L., Wyse, R., Nichols, M., Allender, S., Millar, L., & McElduff, P. (2014). A systematic review and meta-analysis of whole of community interventions to prevent excessive population weight gain. *Preventive Medicine*, *62*, 193-200. doi:10.1016/j.ypmed.2014.01.031

[9] Baker, P. R. A., Francis, D. P., Soares, J., Weightman, A. L., & Foster, C. (2015). Community wide interventions for increasing physical activity. *The Cochrane Database of Systematic Reviews, 1*, Art. No.: CD008366. doi:10.1002/14651858.CD008366.pub3.

[10] Boelsen--Robinson, T., Peeters, A., Beauchamp, A., Chung, A., Gearon, E., & Backholer, K. (2015). A systematic review of the effectiveness of whole-of-community interventions by socioeconomic position. *Obesity Reviews, 16*(9), 806-816. doi:10.1111/obr.12297

[11] Wolfenden, L., et al. (2014). P. 200.

[12] Whittemore, R., Chao, A., Popick, R., & Grey, M. (2013). School-based internet obesity prevention programs for adolescents: a systematic literature review. *The Yale Journal of Biology and Medicine*, *86*(1), 49-62. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3584495/

[13] Nguyen, B., Kornman, K. P., & Baur, L. A. (2011). A review of electronic interventions for prevention and treatment of overweight and obesity in young people. *Obesity Reviews*, *12*(5), e298e314. doi:10.1111/j.1467-789X.2010.00830.x

[14] Lamboglia, C. M. G. F., Silva, V. T. B. L. D., Vasconcelos Filho, J. E. D., Pinheiro, M. H. N. P., Munguba, M. C. D. S., Silva Jœnior, F. V. I., ... & Silva, C. A. B. D. (2013). Exergaming as a strategic tool in the fight against childhood obesity: A systematic review. *Journal of Obesity*, *2013*, 1-8. doi:10.1155/2013/438364

[15] Nollen, N. L., Mayo, M. S., Carlson, S. E., Rapoff, M. A., Goggin, K. J., & Ellerbeck, E. F. (2014). Mobile technology for obesity prevention: a randomized pilot study in racial-and ethnic-minority girls. *American Journal of Preventive Medicine*, *46*(4), 404-408. doi:10.1016/j.amepre.2013.12.011

[16] Smith, J. J., Morgan, P. J., Plotnikoff, R. C., Dally, K. A., Salmon, J., Okely, A. D., ... & Lubans, D. R. (2014). Smart-phone obesity prevention trial for adolescent boys in low-income communities: the ATLAS RCT. *Pediatrics*, *134*(3), e723-e731. doi:10.1542/peds.2014-1012

[17] Faulkner, G. E., Grootendorst, P., Nguyen, V. H., Andreyeva, T., Arbour-Nicitopoulos, K., Auld, M. C., ... & Windmeijer, F. (2011). Economic instruments for obesity prevention: results of a scoping review and modified delphi survey. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 109-122. doi:10.1186/1479-5868-8-109

[18] Thow, A. M., Downs, S., & Jan, S. (2014). A systematic review of the effectiveness of food taxes and subsidies to improve diets: Understanding the recent evidence. *Nutrition Reviews*, *72*(9), 551565. doi:10.1111/nure.12123

[19] Kristensen, A. H., Flottemesch, T. J., Maciosek, M. V., Jenson, J., Barclay, G., Ashe, M., ... & Brownson, R. C. (2014). Reducing childhood obesity through US federal policy: a microsimulation analysis. *American Journal of Preventive Medicine*, *47*(5), 604-612. doi:10.1016/j.amepre.2014.07.011

[20] Gortmaker, S. L., Long, M. W., Resch, S. C., Ward, Z. J., Cradock, A. L., Barrett, J. L., ... & Wang, Y. C. (2015). Cost effectiveness of childhood obesity interventions: evidence and methods for CHOICES. *American Journal of Preventive Medicine*, *49*(1), 102-111. doi:10.1016/j.amepre.2015.03.032

[21] Powell, L. M., Chriqui, J. F., Khan, T., Wada, R., & Chaloupka, F. J. (2013). Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand and body weight outcomes. *Obesity Reviews*, *14*(2), 110-128. doi:10.1111/obr.12002

[22] Reat, A., Crixell, S., Friedman, B., & Bank, J. (2015). Comparison of food intake among infants and toddlers participating in a south central Texas WIC program reveals some improvements after WIC package changes. *Maternal & Child Health Journal*, *19*(8), 1834-1841 8p. doi:10.1007/s10995-015-1697-y

[23] Kimbro, R. T., & Rigby, E. (2010). Federal food policy and childhood obesity: a solution or part of the problem?. *Health Affairs*, 29(3), 411-418. doi:10.1377/hlthaff.2009.0731

[24] Fortson, J. G., & Sanbonmatsu, L. (2010). Child health and neighborhood conditions results from a randomized housing voucher experiment. *Journal of Human Resources*, *45*(4), 840-864.doi:10.1353/jhr.2010.0025

[25] Ludwig, J., Duncan, G. J., Gennetian, L. A., Katz, L. F., Kessler, R. C., Kling, J. R., & Sanbonmatsu, L. (2013). Long-term neighborhood effects on low-income families: evidence from Moving to Opportunity. *American Economic Review*, *103*(3), 226-231. doi:10.1257/aer.103.3.226

[26] Zhou, Y. E., Emerson, J. S., Levine, R. S., Kihlberg, C. J., & Hull, P. C. (2014). Childhood obesity prevention interventions in childcare settings: systematic review of randomized and nonrandomized controlled trials. *American Journal of Health Promotion*, *28*(4), e92-e103. doi:10.4278/ajhp.121129-LIT-579

[27] Bond, M., Wyatt, K., Lloyd, J., & Taylor, R. (2011). Systematic review of the effectiveness of weight management schemes for the under fives. *Obesity Reviews*, 12(4), 242-253. doi:10.1111/j.1467-789X.2010.00713.x

[28] Larson, N., Ward, D. S., Neelon, S. B., & Story, M. (2011). What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *Journal of the American Dietetic Association*, 111(9), 1343-1362. doi:10.1016/j.jada.2011.06.007

[29] Bender, M. S., & Clark, M. J. (2011). Cultural adaptation for ethnic diversity: A review of obesity interventions for preschool children. *Californian Journal of Health Promotion*, *9*(2), 40-60. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3805036/

[30] Laws, R., Campbell, K. J., van der Pligt, P., Russell, G., Ball, K., Lynch, J., ... & Denney-Wilson, E. (2014). The impact of interventions to prevent obesity or improve obesity related behaviours in children (0-5 years) from socioeconomically disadvantaged and/or indigenous families: a systematic review. *BMC Public Health*, 14(1), 779. doi:10.1186/1471-2458-14-779

[31] Sekhobo, J. P., Edmunds, L. S., Dalenius, K., Jernigan, J., Davis, C. F., Giddings, M.. . Kettel Khan, L. (2014). Neighborhood disparities in prevalence of childhood obesity among low-income children before and after implementation of New York City child care regulations. *Preventing Chronic Disease,* 11, E181.. doi:10.5888/pcd11.140152

[32] Lumeng, J. C., Kaciroti, N., & Frisvold, D. E. (2010). Changes in body mass index z score over the course of the academic year among children attending Head Start. *Academic Pediatrics*, *10*(3), 179-186. doi:10.1016/j.acap.2010.01.008

[33] Peirson, L., Fitzpatrick-Lewis, D., Morrison, K., Ciliska, D., Kenny, M., Ali, M. U., & Raina, P. (2015). Prevention of overweight and obesity in children and youth: a systematic review and metaanalysis. *Canadian Medical Association Open Access Journal*, *3*(1), E23-E33. doi:10.9778/cmajo.20140053

[34] Wang, Y., Cai, L., Wu, Y., Wilson, R. F., Weston, C., Fawole, O., ... & Segal, J. (2015). What childhood obesity prevention programmes work? A systematic review and meta-analysis. *Obesity Reviews*, 547-565. doi:10.1111/obr.12277

[35] Waters, E., de Silva-Sanigorski, A., Hall, B. J., Brown, T., Campbell, K. J., Gao, Y., ... & Summerbell, C. D. (2011). Interventions for preventing obesity in children. *The Cochrane Database of Systematic Reviews,* (12). doi: 10.1002/14651858.CD001871.pub3

[36] Thury, C., & de Matos, C. M. (2015). Prevention of childhood obesity: a review of the current guidelines and supporting evidence. *South Dakota Medicine: The Journal Of The South Dakota State Medical Association, Special Issue*, 18-23.

[37] Bambra, C., Hillier, F., Cairns, J., Kasim, A., Moore, H., & Summerbell, C. (2015). How effective are interventions at reducing socioeconomic inequalities in obesity among children and adults? two systematic reviews. *Public Health Research*, *3*(1). doi:10.3310/phr03010

[38] Hillier-Brown, F. C., Bambra, C. L., Cairns, J. M., Kasim, A., Moore, H. J., & Summerbell, C. D. (2014). A systematic review of the effectiveness of individual, community and societal level interventions at reducing socioeconomic inequalities in obesity amongst children. *BMC Public Health*, *14*(1), 834. doi:10.1186/1471-2458-14-834

[39] McGill, R., Anwar, E., Orton, L., Bromley, H., Lloyd-Williams, F., Martin, O., ... & Capewell, S. (2015). Are interventions to promote healthy eating equally effective for all? Systematic review of socioeconomic inequalities in impact. *BMC Public Health*, *15*(1), 457. doi:10.1186/s12889-0151781-7

[40] Beauchamp, A., Backholer, K., Magliano, D., & Peeters, A. (2014). The effect of obesity prevention interventions according to socioeconomic position: a systematic review. *Obesity Reviews*, *15*(7), 541-554. doi:10.1111/obr.12161

[41] Suarez-Balcazar, Y., Friesema, J., & Lukyanova, V. (2013). Culturally competent interventions to address obesity among African American and Latino children and youth. *Occupational Therapy in Health Care*, *27*(2), 113-128. doi:10.3109/07380577.2013.785644

[42] Institute of Medicine (US). (2015). *How Modeling Can Inform Strategies to Improve Population Health: Workshop Summary*. Washington, DC: National Academies Press, prepublication copy: uncorrected proofs. Retrieved from www.nap.edu

[43] Institute of Medicine (US). (2012). *Accelerating progress in obesity prevention: solving the weight of the nation*. Washington, DC: National Academies Press. Retrieved from www.nap.edu

[44] Gittelsohn, J., Mui, Y., Adam, A., Lin, S., Kharmats, A., Igusa, T., & Lee, B.Y. (2015). Incorporating systems science principles into the development of obesity prevention interventions. Principles, benefits, and challenges. *Current Obesity Reports, 4*(2), 174-181. doi:10.1007/s13679015-0147-x

[45] Bures, R. M., Mabry, P. L., Orleans, C. T., & Esposito, L. (2014). Systems science: A tool for understanding obesity. *American Journal of Public Health, 104*(7), 1156-1156. doi:10.2105/AJPH.2014.302082

[46] Johnston, L.M., Matteson, C.L., & Finegood, D.T. (2014). Systems science and obesity policy: A novel framework for analyzing and rethinking population-level planning. *American Journal of Public Health*, *104*, 1270–1278. doi:10.2105/AJPH.2014.301884

[47] Wang, Y., Xue, H., X., Esposito, L., Bar-Yam, Y., & Huang, T.K. (2014). Applications of complex systems science in obesity and noncommunicable chronic disease research. *Advances in Nutrition, 5*(5), 574-577. doi:10.3945/an.114.006650

[48] Lyn, R., Aytur, S., Davis, T. A., Eyler, A. A., Evenson, K. R., Chriqui, J. F.. . Brownson, R. C. (2013). Policy, systems, and environmental approaches for obesity prevention: A framework to inform local and state action. *Journal of Public Health Management and Practice, 19*(3 Suppl 1), S23-S33. Retrieved from http://journals.lww.com/jphmp/Fulltext/2013/05001/Policy,_Systems,_and_Environmental_Approa ches_for.5.aspx

[49] Finegood, D.T. (2011). The complex systems science of obesity. In Cawley J.H. (Ed.), *The Oxford Handbook of the Social Science of Obesity*. New York, NY: Oxford University Press. 208236.

[50] Hammond, R. A. (2009). Complex systems modeling for obesity research. *Preventing Chronic Disease, 6*(3), A97. Retrieved from http://www.cdc.gov/pcd/issues/2009/jul/09_0017.htm

[51] Huang, T.T., Drewnowski, A., Kumanyika, S.K., & Glass, T.A. (2009). A systems-oriented multilevel framework for addressing obesity in the 21st century. *Preventing Chronic Disease*, *6*(3), 1-10. Retrieved from http://www.cdc.gov/pcd/issues/2009/jul/09_0013.htm

[52] Sallis, J.F. (2015). Advancing systems thinking through the Healthy Kids, Healthy Communities evaluation. *Journal of Public Health Management and Practice, 21*(Supp 3), S88. Retrieved from http://journals.lww.com/jphmp/toc/2015/05001

[53] Brennan, L.K., Brownson, R.C., & Kauh, T. J. (2015). Evalutaion of Healthy Kids, Healthy Communities. *Journal of Public Health Management and Practice*, *21*(Supp 3), S4-S7. doi: 10.1097/PHH.0000000000000186

[54] Novick, L. F. (Ed.). (2015). Evaluation of the Healthy Kids, Healthy Communities National. *Journal of Public Health Manage-*

ment and Practice, 21(Supp 3) S1-S136. Retrieved from http://journals.lww.com/jphmp/toc/2015/05001

[55] Williams, N., Dooyema, C. A., Foltz, J. L., Belay, B., & Blanck, H. M. (2015). The childhood obesity research demonstration project: A team approach for supporting a multisite, multisector intervention. *Childhood Obesity*, *11*(1), 104-108. doi:10.1089/chi.2014.0063

[56] Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association*, *311*(8), 806-814. doi:10.1001/jama.2014.732

[57] Ogden, C.L., Carroll, M.D., Fryar, C.D., Flegal, K.M. (2015) prevalence of obesity among adults and youth: United States, 2011–2014. NCHS Data Brief, No. 219. Retrieved from http://1.usa.gov/1MEjJLq

[58] Skinner, A. C., & Skelton, J.A. (2014). Prevalence and trends in obesity and severe obesity among children in the United States, 1999-2012. *JAMA pediatrics*, *168*(6), 561-566. doi:10.1001/jamapediatrics.2014.21

[59] Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *Journal of the American Medical Association*, *307*(5), 483-490. doi:10.1001/jama.2012.40

[60] Olds, T., Maher, C., Zumin, S., PŽneau, S., Lioret, S., Castetbon, K., & Summerbell, C. (2011). Evidence that the prevalence of childhood overweight is plateauing: data from nine countries. *International Journal of Pediatric Obesity*, *6*(5-6), 342-360. doi:10.3109/17477166.2011.605895

[61] Centers for Disease Control and Prevention. (2013). Vital signs: obesity among low-income, preschool-aged children — United States, 2008–2011. *Mobidity and Mortality Weekly Report*, 62(31), 629-34. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6231a4.htm

[62] Wen, X., Gillman, M. W., Rifas-Shiman, S. L., Sherry, B., Kleinman, K., & Taveras, E. M. (2012). Decreasing prevalence of obesity among young children in Massachusetts from 2004 to 2008. *Pediatrics*, *129*(5), 823-831. doi:10.1542/peds.2011-1833

[63] Singh A. S., Mulder C., Twisk J. W., van Mechelen W., Chinapaw M. J. (2008). Tracking of childhood overweight into adulthood: a systematic review of the literature. *Obesity Reviews*, *9* (5):474-488. doi:10.1111/j.1467-789X.2008.00475.x

[64] Gordon-Larsen, P., Suchindran, C., The, N. S., North, K. E., & Popkin, B. M. (2010). Association of adolescent obesity with risk of severe obesity in adulthood. *Journal of the American Medical Association, 304*(18), 2042-2047. doi:10.1001/jama.2010.1635

[65] Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine*, 337(13):869– 873. doi:10.1056/NEJM199709253371301

[66] Koebnick, C., Mohan, Y. D., Li, X., & Young, D. R. (2015). Secular trends of overweight and obesity in young southern Californians 2008-2013. *The Journal of Pediatrics*, In-press. doi:10.1016/j.jpeds.2015.08.039

[67] Frederick, C. B., Snellman, K., & Putnam, R. D. (2014). Increasing socioeconomic disparities in adolescent obesity. *Proceedings of the National Academy of Sciences*, *111*(4), 1338-1342. doi:10.1073/pnas.1321355110

[68] Singh, G. K., Siahpush, M., & Kogan, M. D. (2010). Rising social inequalities in US childhood obesity, 2003–2007. *Annals of Epidemiology*, 20(1), 40-52. doi:10.1016/j.annepidem.2009.09.008

[69] Sharma, A., Grummer-Strawn, L., Dalenius, K., Galuska, D., Anandappa, M., Borland, E., Mackintosh, H., & Smith R. (2009). Obesity prevalence among low-income, preschool-aged children—United States, 1998–2008. *Morbidity and Mortality Weekly Report*, *58*(28), 769-773. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5828a1.htm

[70] Wang, Y., Gortmaker, S. L., & Taveras, E. M. (2011). Trends and racial/ethnic disparities in severe obesity among US children and adolescents, 1976–2006. *International Journal of Pediatric Obesity*, 6(1), 12-20. doi:10.3109/17477161003587774

[71] Wang, Y., & Beydoun, M. A. (2007). The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and metaregression analysis. *Epidemiologic Reviews*, 29(1), 6-28. doi: 10.1093/epirev/mxm007

[72] Rossen, L. M., & Schoendorf, K. C. (2012). Measuring health disparities: trends in racial– ethnic and socioeconomic disparities in obesity among 2-to 18-year old youth in the United States, 2001– 2010. *Annals of Epidemiology*, *22*(10), 698-704. doi:10.1016/j.annepidem.2012.07.005

[73] O'Campo, P. (2013). Harder than rocket science? The science of designing and implementing strong family-friendly policies. In N. S. Landale, S. M. McHale, & A. Booth (Eds.), *Families and Child Health*. New York, NY: Springer. P. 194.

[74] Halfon, N., & Hochstein, M. (2002). Life course health development: an integrated framework for developing health, policy, and research. *Milbank Quarterly*, *80*(3), 433-479. doi:10.1111/14680009.00019

[75] Kuh, D., Ben-Shlomo, Y., Lynch, J., Hallqvist, J., & Power, C. (2003). Life course epidemiology. *Journal of Epidemiology and Community Health*, *57*(10), 778-783. doi:10.1136/jech.57.10.778

[76] Braveman, P., & Barclay, C. (2009). Health disparities beginning in childhood: a life-course perspective. *Pediatrics*, *124*(Supplement 3), S163-S175. doi:10.1542/peds.2009-1100D

[77] Adler, N. E., & Stewart, J. (2010). Health disparities across the lifespan: meaning, methods, and mechanisms. *Annals of the New York Academy of Sciences*, *1186*(1), 5-23. doi:10.1111/j.17496632.2009.05337.x

[78] Pudrovska, T., Logan, E. S., & Richman, A. (2014). Early-life social origins of later-life body weight: The role of socioeconomic status and health behaviors over the life course. *Social Science Research*, *46*, 59-71. doi:10.1016/j.ssresearch.2014.02.007

[79] Bae, D., Wickrama, K. A. S., & O'Neal, C. W. (2014). Social consequences of early socioeconomic adversity and youth BMI trajectories: Gender and race/ethnicity differences. *Journal of Adolescence*, *37*(6), 883-892. doi:10.1016/j.adolescence.2014.06.002

[80] Khlat, M., Jusot, F., & Ville, I. (2009). Social origins, early hardship and obesity: a strong association in women, but not in men? *Social Science & Medicine*, 68(9), 1692–1699. doi:10.1016/j.socscimed.2009.02.024

[81] Giskes, K., van Lenthe, F.J., Turrell, G., Kamphuis, C.B., Brug, J., & Mackenbach, J.P. (2008). Socioeconomic position at different stages of the life course and its influence on body weight and weight gain in adulthood: a longitudinal study with 13-year follow-up. *Obesity,* 16(6), 1377–1381. doi:10.1038/oby.2008.54

[82] Dixon, B., Pe–a, M. M., & Taveras, E. M. (2012). Lifecourse approach to racial/ethnic disparities in childhood obesity. *Advances in Nutrition: An International Review Journal*, *3*(1), 73-82. doi:10.3945/an.111.000919

[83] Harrington JW, Nguyen VQ, Paulson JF, et al. (2010) Identifying the "Tipping Point" age for overweight pediatric patients. *Clinical Pediatrics, 49*(7), 638-643. doi:10.1177/0009922809359418

[84] Levine, J. A. (2011). Poverty and obesity in the U.S. *Diabetes*, *60*(11), 2667-2668. doi:10.2337/db11-1118

[85] Drewnowski, A., & Specter, S. E. (2004). Poverty and obesity: the role of energy density and energy costs. *The American Journal of Clinical Nutrition*, *79*(1), 6-16. Retrieved from http://ajcn.nutrition.org/content/79/1/6.long

[86] Saelens, B. E., Sallis, J. F., Frank, L. D., Couch, S. C., Zhou, C., Colburn, T., ... & Glanz, K. (2012). Obesogenic neighborhood environments, child and parent obesity: The Neighborhood Impact on Kids study. *American Journal of Preventive Medicine*, *42*(5), e57-e64. doi:10.1016/j.amepre.2012.02.008

[87] Grow, H. M. G., Cook, A. J., Arterburn, D. E., Saelens, B. E., Drewnowski, A., & Lozano, P. (2010). Child obesity associated with social disadvantage of children's neighborhoods. *Social Science & Medicine*, *71*(3), 584-591. doi:10.1016/j.socscimed.2010.04.018

[88] Black, J. L., Macinko, J., Dixon, L. B., & Fryer Jr, G. E. (2010). Neighborhoods and obesity in New York City. *Health & Place*, *16*(3), 489-499. doi:10.1016/j.healthplace.2009.12.007

[89] Wickrama, K. T., Wickrama, K. A., & Bryant, C. M. (2006). Community influence on adolescent obesity: Race/ethnic differences. *Journal of Youth and Adolescence*, *35*(4), 641-651. doi:10.1007/s10964-006-9050-9

[90] Dietz, W. H. (2015). The Response of the US Centers for Disease Control and Prevention to the Obesity Epidemic. *Annual Review of Public Health*, *36*(1), 575-596. doi:10.1146/annurevpublhealth-031914-122415

[91] White House Task Force on Childhood Obesity. (2010). *Solving the problem of childhood obesity in a generation: report to the president*. Washington, D.C.: Executive Office of the President of the United States. Retrieved from http://www.letsmove.gov/sites/letsmove.gov/files/

[92] Cobb, L. K., Appel, L. J., Franco, M., Jones-Smith, J. C., Nur, A., & Anderson, C. A. (2015). The relationship of the local food environment with obesity: A systematic review of methods, study quality, and results. *Obesity*, *23*(7), 1331-1344. doi:10.1002/oby.21118

[93] Cobb et al., (2015). P. 1331.

[94] Cobb et al., (2015). P. 1331.

[95] Ferdinand, A.O., Sen, B., Rahurkar, S., Engler, S., & Menachemi, N. (2012). The relationship between built environments and physical activity: a systematic review. *American Journal of Public Health*, *102*(10), e7-e13. doi:10.2105/AJPH.2012.300740

[96] Casagrande, S. S., Whitt-Glover, M. C., Lancaster, K. J., Odoms-Young, A. M., & Gary, T. L. (2009). Built environment and health behaviors among African Americans: a systematic review. *American Journal of Preventive Medicine*, *36*(2), 174-181. doi:10.1016/j.amepre.2008.09.037

[97] Ding, D., & Gebel, K. (2012). Built environment, physical activity, and obesity: what have we learned from reviewing the literature? *Health & Place*, *18*(1), 100-105. doi:10.1016/j.healthplace.2011.08.021

[98] Gebel, K., Bauman, A. E., & Petticrew, M. (2007). The physical environment and physical activity: a critical appraisal of review articles. *American Journal of Preventive Medicine*, *32*(5), 361-369. doi:10.1016/j.amepre.2007.01.020

[99] Acevedo-Garcia, D., & Osypuk, T. L. (2008). Invited commentary: residential segregation and health—the complexity of modeling separate social contexts. *American Journal of Epidemiology*, *168*(11), 1255-1258. doi:10.1093/aje/kwn290 P. 1255.

[100] Macintyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: how can we conceptualise, operationalise and measure them? *Social Science & Medicine*, *55*(1), 125-139. doi:10.1016/S0277-9536(01)00214-3

[101] Landrine, H., & Corral, I. (2009). Separate and unequal: residential segregation and black health disparities. *Ethnicity & Disease*, *19*(2), 179-184. Retrieved from http://bit.ly/1Mwo9WY

[102] Williams, D. R., & Jackson, P. B. (2005). Social sources of racial disparities in health. *Health Affairs*, *24*(2), 325-334. doi:10.1377/

hlthaff.24.2.325

[103] Williams, D. R., & Collins, C. (2001). Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Reports*, *116*(5), 404-416. doi:10.1016/S00333549(04)50068-7

[104] Acevedo-Garcia, D., Lochner, K. A., Osypuk, T. L., & Subramanian, S. V. (2003). Future directions in residential segregation and health research: a multilevel approach. *American Journal of Public Health*, *93*(2), 215-221. doi:10.2105/AJPH.93.2.215

[105] Acevedo-Garcia, D., & Osypuk, T. L. (2008). P. 1256.

[106] Chang, V. W. (2006). Racial residential segregation and weight status among U.S. adults. *Social Science & Medicine*, 63, 1289-1303. doi:10.1016/j.socscimed.2006.03.049

[107] Kershaw, K. N., Albrecht, S. S., & Carnethon, M. R. (2013). Racial and ethnic residential segregation, the neighborhood socioeconomic environment, and obesity among Blacks and Mexican Americans. *American Journal of Epidemiology*, *177*(4), 299-309. doi:10.1093/aje/kws372

[108] Corral, I., Landrine, H., Hao, Y., Zhao, L., Mellerson, J. L., & Cooper, D. L. (2011). Residential segregation, health behavior and overweight/obesity among a national sample of African American adults. *Journal of Health Psychology, 17*(3), 371-378. doi:10.1177/1359105311417191

[109] Corral, I., Landrine, H., & Zhao, L. (2014). Residential segregation and obesity among a national sample of Hispanic adults. *Journal of Health Psychology*, *19*(4), 503-508. doi:10.1177/1359105312474912

[110] Kershaw, K. N., & Albrecht, S. S. (2014). Metropolitan-level ethnic residential segregation, racial identity, and body mass index among US Hispanic adults: a multilevel cross-sectional study. *BMC Public Health*, *14*(1), 283. doi:10.1186/1471-2458-14-283

[111] Rossen, L. M., & Talih, M. (2014). Social determinants of disparities in weight among us children and adolescents. *Annals of Epidemiology*, *24*(10), 705-713. doi:10.1016/j.annepidem.2014.07.010

[112] Ryabov, I. (2015). The role of residential segregation in explaining racial gaps in childhood and adolescent obesity. *Youth & Society*. doi: 0044118X15607165

[113] Rossen, L. M., & Talih, M. (2014). P. 705.

[114] Rossen, L. M., & Talih, M. (2014). P. 711

[115] Sanbonmatsu, L., Ludwig, J., Katz, L.F.,…& Lindau, S. T. (2011). *Moving to Opportunity for Fair Housing Demonstration Program: Final Impacts Evaluation*. Report prepared by the National Bureau of Economic Research Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research. Retrieved from http://bit.ly/1LHVFca

[116] Fortson, J. G., & Sanbonmatsu, L. (2010). Child health and neighborhood conditions results from a randomized housing voucher experiment. *Journal of Human Resources*, *45*(4), 840-864. doi:10.1353/jhr.2010.0025

[117] Ludwig, J., Sanbonmatsu, L., Gennetian, L., Adam, E., Duncan, G. J., Katz, L. F., ... & McDade, T. W. (2011). Neighborhoods, obesity, and diabetes—a randomized social experiment. *New England Journal of Medicine*, *365*(16), 1509-1519. doi:10.1056/NEJMsa1103216

[118] Chetty, R., Hendren, N., & Klein, L. (2015). The effects of exposure to better neighborhoods on children: new evidence from the Moving to Opportunity Experiment, Unpublished manuscript, retrieved from http://scholar.harvard.edu/files/lkatz/files/mto_manuscript_may2015.pdf

[119] Crowder, K., & South, S. J. (2011). Spatial and temporal dimensions of neighborhood effects on high school graduation. *Social Science Research*, *40*(1), 87-106. doi:10.1016/j.ssresearch.2010.04.013

[120] Wodtke, G. T., Harding, D. J., & Elwert, F. (2011). Neighborhood effects in temporal perspective: the impact of long-term exposure to concentrated disadvantage on high school graduation. *American Sociological Review*, *76*(5), 713-736. doi:10.1177/0003122411420816

[121] Ma, C. T., Gee, L., & Kushel, M. B. (2008). Associations between housing instability and food insecurity with health care access in low-income children. *Ambulatory Pediatrics*, *8*(1), 50-57. doi:10.1016/j.ambp.2007.08.004

[122] Reid, K. W., Vittinghoff, E., & Kushel, M. B. (2008). Association between the level of housing instability, economic standing and health care access: a meta-regression. *Journal of Health Care for the Poor and Underserved*, *19*(4), 1212-1228. doi:10.1353/hpu.0.0068

[123] Kushel, M. B., Gupta, R., Gee, L., & Haas, J. S. (2006). Housing instability and food insecurity as barriers to health care among low--income Americans. *Journal of General Internal Medicine*, *21*(1), 71-77. doi:10.1111/j.1525-1497.2005.00278.x

[124] Herbers, J. E., Reynolds, A. J., & Chen, C. C. (2013). School mobility and developmental outcomes in young adulthood. *Development and Psychopathology*, *25*(02), 501-515. doi:10.1017/S0954579412001204

[125] Isaacs, J. B. (2012). The ongoing impact of foreclosures on children. Washington, DC: Brookings Institution, March, 201(2). Retrieved from http://brook.gs/1LmJrCa

[126] Currie, J., & Tekin, E. (2014). Is there a Link between Foreclosure and Health? Unpublished manuscript. Retrieved from http://bit.ly/1NFOxve

[127] Vornovitsky, M., Gottschalck, A., & Smith, A. (2014). Distribution of household wealth in the U.S.: 2000 to 2011. Washington, DC: United States Census Bureau. Retrieved from http://bit.ly/1I3NbxJ

[128] Tippett, R., Jones-DeWeever, A., Rockeymoore, M., Hamilton, D., & Darity, W. (2014). Beyond Broke: Why Closing the Racial Wealth Gap is a Priority for National Economic Security. *Report prepared by Center for Global Policy Solutions and The Research Network on Ethnic and Racial Inequality at Duke University with funds provided by the Ford Foundation*. Retrieved from http://bit.ly/1I1YztU

[129] Boshara, R., & Emmons, W. R. (2015). A balance sheet perspective on financial success: Why starting early matters. *Journal of Consumer Affairs*, *49*(1), 267-298. doi: 10.1111/joca.12056

[130] Friedline, T., & Rauktis, M. (2014). Young people are the front lines of financial inclusion: A review of 45 years of research. *Journal of Consumer Affairs*, *48*(3), 535-602. doi: 10.1111/joca.12050

[131] Shanks, T. R. W. (2007). The impacts of household wealth on child development. *Journal of Poverty*, *11*(2), 93-116. doi: 10.1300/J134v11n02_05.

[132] Orr, A. (2003). Black-white differences in achievement: The importance of wealth. *Sociology of Education, 76*(4), 281-304. doi:10.2307/1519867

[133] Conley, D. (2001). Capital for college: Parental assets and postsecondary schooling. *Sociology of Education*, 59-72. doi: 10.2307/2673145.

[134] Huang, J., Sherraden, M., Kim, Y., & Clancy, M. (2014). Effects of Child Development Accounts on early social-emotional development: An experimental test. *JAMA Pediatrics*, *168*(3), 265-271. doi:10.1001/jamapediatrics.2013.4643

[135] Grinstein-Weiss, M., Shanks, T. R. W., & Beverly, S. G. (2014). Family assets and child -outcomes: Evidence and directions. *The Future of Children*, *24*(1), 147-170. doi: 10.1353/foc.2014.0002

[136] Singh, G. K., Kogan, M. D., & Stella, M. Y. (2009). Disparities in obesity and overweight prevalence among US immigrant children and adolescents by generational status. *Journal of Community Health*, *34*(4), 271-281. doi:10.1007/s10900-009-9148-6

[137] Singh, G. K., Yu, S. M., & Kogan, M. D. (2012). Health, chronic conditions, and behavioral risk disparities among US immigrant children and adolescents. *Public Health Reports (Washington, DC: 1974)*, *128*(6), 463-479. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/24179258

[138] Delavari, M., Sønderlund, A. L., Swinburn, B., Mellor, D., & Renzaho, A. (2013). Acculturation and obesity among migrant populations in high income countries-a systematic review. *BMC Public Health*, *13*458. doi:10.1186/1471-2458-13-458

[139] Singh, G. K., et al. (2009). P. 271.

[140] Brewer, M., & Kimbro, R. T. (2014). Neighborhood context and immigrant children's physical activity. *Social Science & Medicine (1982), 116*, 1-9. doi:10.1016/j.socscimed.2014.06.022

[141] Tovar, A., Renzaho, A. M., Guerrero, A. D., Mena, N., & Ayala, G. X. (2014). A systematic review of obesity prevention intervention studies among immigrant populations in the US. *Current Obesity Reports*, *3*(2), 206-222. doi:10.1007/s13679-014-0101-3

[142] Kaufman-Shriqui, V., Fraser, D., Friger, M., Bilenko, N., Vardi, H., Abu-Saad, K.. . Shahar, D. R. (2013). Factors associated with childhood overweight and obesity among acculturated and new immigrants. *Ethnicity & Disease, 23*(3), 329. Retrieved from http://www.researchgate.net/publication/255692822

[143] Hernández-Valero, M. A., Bustamante-Montes, L. P., Hernández, M., Halley-Castillo, E., Wilkinson, A. V., Bondy, M. L., & Olvera, N. (2012). Higher risk for obesity among Mexican– American and Mexican immigrant children and adolescents than among peers in Mexico. *Journal of Immigrant and Minority Health, 14*(4), 517-522. doi:10.1007/s10903-011-9535-9

[144] Ishizawa, H., & Jones, A. (2015). Immigrant neighborhood concentration, acculturation, and obesity among young adults. *Journal of Urban Affairs.* doi: 10.1111/juaf.12208

[145] McCrory, C., & Layte, R. (2012). Breastfeeding and risk of overweight and obesity at nine years of age. *Social Science & Medicine, 75*(2), 323-330. doi:10.1016/j.socscimed.2012.02.048

[146] Institute of Medicine (US). (2012). *Accelerating progress in obesity prevention: solving the weight of the nation*. Washington, DC: National Academies Press. Retrieved from http://www.nap.edu/catalog/13275/accelerating-progress-in-obesity-prevention-solving-the-weightof-the

[147] Institute of Medicine (US). (2012). P. 311.

[148] Dixon, B., Pe–a, M. M., & Taveras, E. M. (2012). Lifecourse approach to racial/ethnic disparities in childhood obesity. *Advances in Nutrition: An International Review Journal*, *3*(1), 7382. doi:10.3945/an.111.000919

[149] Yan, J., Liu, L., Zhu, Y., Huang, G., & Wang, P. P. (2014). The association between breastfeeding and childhood obesity: A meta-analysis. *BMC Public Health, 14*(1), 1267-1267. doi:10.1186/1471-2458-14-1267

[150] Gibbs, B. G., & Forste, R. (2014). Socioeconomic status, infant feeding practices and early childhood obesity. *Pediatric Obesity, 9*(2), 135-146. doi:10.1111/j.2047-6310.2013.00155.x

[151] Lumeng, J. C., Taveras, E. M., Yanovski, S. Z., & Birch, L. (2015). Prevention of obesity in infancy and early childhood: A National Institutes of Health workshop. *JAMA Pediatrics, 169*(5), 484-490. doi:10.1001/jamapediatrics.2014.3554

[152] Monasta, L., et al. (2010). P. 704.

[153] Rossem, L., Hafkamp-De Groen, E., Mackenbach, J., Jaddoe, V., Raat, H., & Hofman, A. (2014). The role of early life factors in the development of ethnic differences in growth and overweight in preschool children: A prospective birth cohort. *BMC Public Health, 14*(1), 722-722. doi:10.1186/1471-2458-14-722

[154] Martin, R., Patel, R., Foo, Y., Smith, G., Palmer, T., Kramer, M., & ... Gusina, N. (2013). Effects of promoting longer-term and exclusive breastfeeding on adiposity and insulin-like growth factor-I at age 11.5 years: A randomized trial. *JAMA -Journal Of The American Medical Association*, *309*(10), 1005-1013. doi:10.1001/jama.2013.167

[155] Smithers, L. G., Kramer, M. S., & Lynch, J. W. (2015). Effects of breastfeeding on obesity and intelligence: causal insights from different study designs. *JAMA Pediatrics*, *169*(8), 707-708. doi:10.1001/jamapediatrics.2015.0175

[156] Khalak, R., Cummings, J., & Dexter, S. (2015). Maternal obesity: significance on the preterm neonate. *International Journal of Obesity*, *39*(10), 1433-1436 4p. doi:10.1038/ijo.2015.107

[157] Lemas, D. J., Brinton, J. T., Shapiro, A. L. B., Glueck, D. H., Friedman, J. E., & Dabelea, D. (2015). Associations of maternal weight status prior and during pregnancy with neonatal cardiometabolic markers at birth: the Healthy Start study. *International Journal of Obesity*, *39*(10), 1437-1442. doi:10.1038/ijo.2015.109

[158] Monasta, L., Cattaneo, A., Batty, G. D., Lutje, V., Ronfani, L., Brug, J., & Lenthe, F. J. (2010). Early-life determinants of overweight and obesity: A review of systematic reviews. *Obesity Reviews, 11*(10), 695-708. doi:10.1111/j.1467-789X.2010.00735.x

[159] Dixon, B., et al. (2012). P. 74.

[160] McCrory, C., & Layte, R. (2012). P. 329.

[161] Thompson, A. L., & Bentley, M. E. (2013). The critical period of infant feeding for the development of early disparities in obesity. *Social Science & Medicine, 97*, 288-296. doi:10.1016/j.socscimed.2012.12.007

[162] Chapman, D. J., & Pérez-Escamilla, R. (2012). Breastfeeding among minority women: Moving from risk factors to interventions. *Advances in Nutrition (Bethesda, Md.), 3*(1), 95-104. doi:10.3945/an.111.001016

[163] Shafai, T., Mustafa, M., & Hild, T. (2014). Promotion of exclusive breastfeeding in low-income families by improving the WIC food package for breastfeeding mothers. *Breastfeeding Medicine*, *9*(8), 375-376. doi:10.1089/bfm.2014.0062

[164] Gibbs, B. G., & Forste, R. (2014). P. 142.

[165] Swinburn, B. A., Sacks, G., Hall, K. D., McPherson, K., Finegood, D. T., Moodie, M. L., & Gortmaker, S. L. (2011). The global obesity pandemic: shaped by global drivers and local environments. *The Lancet*, 378, 9793, 804-814. doi: http://dx.doi.org/10.1016/S01406736(11)60813-1

[166] Swinburn, B., Sacks, G., & Ravussin, E. (2009). Increased food energy supply is more than sufficient to explain the US epidemic of obesity. *The American Journal of Clinical Nutrition*, 90, 6, 1453-1456. doi:10.3945/ajcn.2009.28595

[167] Katan, M. B., & Ludwig, D. S. (2010). Extra calories cause weight gain—but how much? *Journal of the American Medical Association*, *303*(1), 65-66. doi:10.1001/jama.2009.1912.

[168] US Department of Agriculture, Economic Research Service. (2015). Food availability and consumption. Retrieved from http://1.usa.gov/1N3wjYC

[169] Wallinga, D. (2010). Agricultural policy and childhood obesity: a food systems and public health commentary. *Health Affairs*, 29(3), 405-410. doi:10.1377/hlthaff.2010.0102

[170] Wallinga, D., Schoonover, H., & Muller, M. (2009). Considering the contribution of US agricultural policy to the obesity epidemic: overview and opportunities. *Journal of Hunger & Environmental Nutrition*, *4*(1), 3-19. doi:10.1080/19320240802706817

[171] Friel, S., Hattersley, L., Snowdon, W., Thow, A., Lobstein, T., Sanders, D., & ... Walker, C. (2013). Monitoring the impacts of trade agreements on food environments. *Obesity Reviews: An Official Journal Of The International Association For The Study Of Obesity*, *14 Suppl 1*120-134. doi:10.1111/obr.12081

[172] Wallinga, D., et al. (2009). P. 11.

[173] Wallinga, D., et al. (2009). P. 12.

[174] Faulkner, G. E., Grootendorst, P., Nguyen, V. H., Andreyeva, T., Arbour-Nicitopoulos, K., Auld, M. C., ... & Windmeijer, F. (2011). Economic instruments for obesity prevention: results of a scoping review and modified delphi survey. *International Journal of Beahvioral Nutrition and Physical Activity*, *8*(1), 109-122. doi:10.1186/1479-5868-8-109

[175] Sturm, R., & An, R. (2014). Obesity and economic environments. *CA: A Cancer Journal for Clinicians*, *64*(5), 337-350. doi:10.3322/caac.21237

[176] Hawkes, C., Friel, S., Lobstein, T., & Lang, T. (2012). Linking agricultural policies with obesity and noncommunicable diseases: a new perspective for a globalising world. *Food Policy*, *37*(3), 343353. doi:10.1016/j.foodpol.2012.02.011

[177] Sturm, R., & An, R. (2014). P. 342.

[178] Specter, M. (2015). Freedom from fries: can fast food be good for you? *The New Yorker*, November 2. Retrieved from http://nyr.kr/1R9KLxq

[179] Malik, V. S., & Hu, F. B. (2015). Fructose and cardiometabolic health: what the evidence from sugar-sweetened beverages tells us. *Journal of the American College of Cardiology*, *66*(14), 1615-1624. doi:10.1016/j.jacc.2015.08.025 P. 1616.

[180] DeBoer, M.D. & Scharf R.J. (In press). Sugar-sweetened beverages and children's health. *Annual Review of Public Health, 37.*

[181] Malik, V. S., Pan, A., Willett, W. C., & Hu, F. B. (2013). Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *The American Journal of Clinical Nutrition*, *98*(4), 1084-1102. doi:10.3945/ajcn.113.058362

[182] Hu, F. B. (2013). Resolved: there is sufficient scientific evidence that decreasing sugar-sweetened beverage consumption will reduce the prevalence of obesity and obesity-related diseases. *Obesity Reviews*, *14*(8), 606-619. doi:10.1111/obr.12040

[183] Blisard, W. N., Stewart, H., & Jolliffe, D. (2004). *Low-income households' expenditures on fruits and vegetables*. Washington, DC: US Department of Agriculture, Economic Research Service. Retrieved from http://bit.ly/1NcjJb5

[184] Otero, G., Pechlaner, G., Liberman, G., & GŸrcan, E. (2015). The neoliberal diet and inequality in the United States. *Social Science & Medicine*, *142*, 47-55. doi:10.1016/j.socscimed.2015.08.005

[185] Larson, N., & Story, M. (2015). Barriers to equity in nutritional health for US children and adolescents: a review of the litera-

ture. *Current Nutrition Reports*, *4*(1), 102-110. doi:10.1007/s13668-014-0116-0

[186] Kumanyika, S., Grier, S. A., Lancaster, K., & Lassiter, V. (2011). Impact of sugar-sweetened beverage consumption on black American's health. *Research Brief. African American Collaborative Obesity Research Network, Philadelphia, PA*. Retrieved from http://www.aacorn.org/RepoRese-2542.html

[187] Mosisa, A., & Hipple, S. (2006). Trends in labor force participation in the United States. *Monthly Labor Review, 129*, 35-57 Retrieved from http://1.usa.gov/1XlUfHE

[188] Smith, L., Ng, S., & Popkin, B. (2013). Trends in US home food preparation and consumption: Analysis of national nutrition surveys and time use studies from 1965-1966 to 2007-2008. *Nutrition Journal, 12*(1), 45-45. doi:10.1186/1475-2891-12-45

[189] Poti, J. M., & Popkin, B. M. (2011). Trends in energy intake among US children by eating location and food source, 1977-2006. *Journal of the American Dietetic Association, 111*(8), 11561164. doi:10.1016/j.jada.2011.05.007

[190] Appelhans, B. M., Waring, M. E., Schneider, K. L., & Pagoto, S. L. (2014). Food preparation supplies predict children's family meal and home-prepared dinner consumption in low-income households. *Appetite, 76*, 1. doi:10.1016/j.appet.2014.01.008

[191] Pooler, J. (2015, November). Positive impact of a nutrition education program for low-income adults on food resource management skills and self-efficacy. In *143rd APHA Annual Meeting and Exposition,* 334226 *(October 31-November 4, 2015)*. APHA.

[192] Molitor, F., Sugerman, S., Yu, H., Biehl, M., Aydin, M., Levy, M., & Ponce, N. A. (2015). Reach of Supplemental Nutrition Assistance Program–Education (SNAP–Ed) interventions and nutrition and physical activity-related outcomes, California, 2011–2012. *Preventing Chronic Disease*, *12*, E33. http://doi.org/10.5888/pcd12.140449

[193] Cohen, D. A., Sturm, R., Scott, M., Farle, T. A., & Bluthenthal, R. (2010). Not enough fruit and vegetables or too many cookies, candies, salty snacks, and soft drinks?. *Public Health Reports*, *125*(1), 88-95. Retrieved from http://www.jstor.org/stable/41434752

[194] Grier, S. A., & Kumanyika, S. K. (2008). The context for choice: Health implications of targeted food and beverage marketing to african americans. *American Journal of Public Health, 98*(9), 1616-1629. doi:10.2105/AJPH.2007.115626

[195] United States Federal Trade Commission. (2012). *A review of food marketing to children and adolescents: Follow-up report*. Washington, D.C.: Federal Trade Commission. Retrieved from https://www.ftc.gov/reports/review-food-marketing-children-adolescents-follow-report

[172] Adler, S. (2015). Perspective: Keeping kids healthy means keeping schools free of unhealthy food ads. *Reporting on Health, The Health Journalism Fellowship.* Retrieved from http://www.reportingonhealth.org/2015/09/24/perspective-keeping-kids-healthy-means-keepingschools-free-unhealthy-food-ads

[197] Institute of Medicine (US). (2012). *Accelerating progress in obesity prevention: solving the weight of the nation*. Washington, DC: National Academies Press. Retrieved from http://www.nap.edu/catalog/13275/accelerating-progress-in-obesity-prevention-solving-the-weightof-the P. 252.

[198] Lee, H. (2011). Inequality as an explanation for obesity in the United States. *Sociology Compass*, *5*(3), 215-232. doi: 10.1111/j.1751-9020.2010.00355.x

[199] Larson, N., & Story, M. (2015). Barriers to equity in nutritional health for U.S. children and adolescents: A review of the literature. *Current Nutrition Reports, 4*(1), 102-110. doi:10.1007/s13668-014-0116-0 P. 102.

[200] Kumanyika, S., Grier, S. A., Lancaster, K., & Lassiter, V. (2011). Impact of sugar-sweetened beverage consumption on black American's health. *Research Brief. African American Collaborative Obesity Research Network, Philadelphia, PA*. Retrieved from http://www.aacorn.org/RepoRese-2542.html

[201] Kramer, K., et al. (2012). P. 2.

[178] Rudd Center for Food Policy & Obesity. (2015). *Food advertising targeted to Hispanic and Black youth: Contributing to health disparities.* Retrieved from http://www.uconnruddcenter.org/targeted-marketing

[203] Powell, L. M., Wada, R., & Kumanyika, S. K. (2014). Racial/ethnic and income disparities in child and adolescent exposure to food and beverage television ads across the U.S. media markets. *Health & Place, 29*, 124-131. doi:10.1016/j.healthplace.2014.06.006

[204] Kunkel, D., Mastro, D., Ortiz, M., & McKinley, C. (2013). Food Marketing to Children on U.S. Spanish-Language Television. *Journal Of Health Communication*, *18*(9), 1084-1096. doi:10.1080/10810730.2013.768732

[205] Kramer, K., Schwarte, L., Lafleur, M., & Williams, J. D. (2013). Targeted marketing of junk food to ethnic minority youth: fighting back with legal advocacy and community engagement. *Advances In Communication Research To Reduce Childhood Obesity*, 389-405. doi:10.1007/978-14614-5511-0_18

[206] Yancey, A. K., Cole, B. L., Brown, R., Williams, J. D., Hillier, A., Kline, R. S., ... & McCarthy, W. J. (2009). A cross-sectional prevalence study of ethnically targeted and general audience outdoor obesity-related advertising. *Milbank Quarterly*, *87*(1), 155-184. doi:10.1111/j.14680009.2009.00551.x

[207] Harris, J. L., Pomeranz, J. L., Lobstein, T., & Brownell, K. D. (2009). A crisis in the marketplace: how food marketing contributes to childhood obesity and what can be done. *Annual Review of Public Health*, *30*, 211-225. doi:10.1146/annurev.publhealth.031308.100304

[208] Kunkel, D., Castonguay, J. S., & Filer, C. R. (2015). Evaluating industry self-regulation of food marketing to children. *American Journal of Preventive Medicine, 49*(2), 181-187. doi:10.1016/j.amepre.2015.01.027

[209] Galbraith-Emami, S., & Lobstein, T. (2013). The impact of initiatives to limit the advertising of food and beverage products to children: A systematic review. *Obesity Reviews, 14*(12), 960-974. doi:10.1111/obr.12060

[210] Chambers, S. A., Freeman, R., Anderson, A. S., & MacGillivray, S. (2015). Reducing the volume, exposure and negative impacts of advertising for foods high in fat, sugar and salt to children: A systematic review of the evidence from statutory and self-regulatory actions and educational measures. *Preventive Medicine, 75*, 32-43. doi:10.1016/j.ypmed.2015.02.011

[211] Kraak, V. I., Story, M., & Wartella, E. A. (2012). Government and school progress to promote a healthful diet to American children and adolescents: a comprehensive review of the available evidence. *American Journal of Preventive Medicine*, *42*(3), 250-262. doi:10.1016/j.amepre.2011.10.025

[212] Mikailova, M. (2014). Advertising and childhood obesity: the role of the federal government in limiting children's exposure to unhealthy advertisements. *Fed. Comm. LJ*, *66*, 327. Retrieved from http://www.fclj.org/wp-content/uplo**ads**/2014/06/66.2.4_Mikailova-Final.pdf P. 333.

[213] Powell, L. M., et al. (2014). P. 221.

[214] Mialon, M., Swinburn, B., & Sacks, G. (2015). A proposed approach to systematically identify and monitor the corporate political activity of the food industry with respect to public health using publicly available information. *Obesity Reviews, 16*(7), 519-530. doi:10.1111/obr.12289

[215] Institute of Medicine (US). (2012). P. 255.

[216] Gortmaker, S. L., Long, M. W., Resch, S. C., Ward, Z. J., Cradock, A. L., Barrett, J. L., ... & Wang, Y. C. (2015). Cost effectiveness of childhood obesity interventions: evidence and methods for CHOICES. *American Journal of Preventive Medicine*, *49*(1), 102-111. doi:10.1016/j.amepre.2015.03.032

[217] Kristensen, A. H., Flottemesch, T. J., Maciosek, M. V., Jenson, J., Barclay, G., Ashe, M., ... & Brownson, R. C. (2014). Reducing childhood obesity through US federal policy: a microsimulation analysis. *American Journal of Preventive Medicine*, *47*(5), 604-612. doi:10.1016/j.amepre.2014.07.011

[218] Wilde, P., Morgan, E., Roberts, J., Schpok, A., & Wilson, T. (2012). Relationship between funding sources and outcomes of obesity-related research. *Physiology & Behavior, 107*(1), 172. doi:10.1016/j.physbeh.2012.05.004

[219] Kaiser, K. A., Cofield, S. S., Fontaine, K. R., Glasser, S. P., Thabane, L., Chu, R., ... & Allison, D. B. (2012). Is funding source related to study reporting quality in obesity or nutrition randomized control trials in top-tier medical journals? *International Journal of Obesity*, *36*(7), 977-981.doi:10.1038/ijo.2011.207

[220] Myers, E. F., Parrott, J. S., Cummins, D. S., & Splett, P. (2011). Funding source and research report quality in nutrition practice-related research. *PloS One*, *6*(12), e28437-e28437. doi:10.1371/journal.pone.0028437

[221] Lesser, L. I., Ebbeling, C. B., Goozner, M., Wypij, D., & Ludwig, D. S. (2007). Relationship between funding source and conclusion among nutrition-related scientific articles. *PLoS Medicine*, *4*(1), 41-46. doi:10.1371/journal.pmed.0040005 P. 44.

[222] Bes-Rastrollo, M., Schulze, M. B., Ruiz-Canela, M., & Martinez-Gonzalez, M. A. (2013). Financial conflicts of interest and reporting bias regarding the association between sugar-sweetened beverages and weight gain: a systematic review of systematic reviews. *Plos Medicine*, *10*(12), 1-9. doi:10.1371/journal.pmed.1001578 P. 1.

[223] O'Conner, A. (2015, September 28). Coke spends lavishly on pediatricians and dietitians. *New York Times*. Retrieved from http://well.blogs.nytimes.com/2015/09/28/coke-spends-lavishly-onpediatricians-and-dietitians/?smprod=nytcore-iphone&smid=nytcore-iphone-share&_r=1

Appendix

Community-based Interventions

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Magnusson et al., 2011	Assess trends in obesity, health beliefs, and lifestyles in Swedish schoolchildren before and after a community-based intervention, with a focus on socioeconomic disparities.	Children ages 11-12; duration five years	Study conducted in two schools, one in a high-SES area and one in a low-SES area in Gothenburg, Sweden; N= 340	Ecological longitudinal study	2003 - 2008	Students participated in three cross-sectional surveys assessing food-related behaviors, physical activity and health beliefs, along with anthropometric examinations. Comparisons were made before and after a community-based intervention (2003 vs 2008) within the low-SES school as well as between the low and high-SES school in 2008.	In the intervention group attending the low SES school, the BMI z-score distribution curve showed a significant decrease for girls but not for boys after five years. BMI z-scores decreased overall from 0.80 to 0.46; overall prevalence of obesity decreased from 13% to 6.7% but was not statistically significant.	Study focused on the efficacy of a community-based mutli-level intervention in a low-SES school.	With no low-SES control school in 2003 or 2008, it was not possible to study changes in a similar community without the intervention; high-SES school was not surveyed in 2003.
Baker et al., 2015	Evaluate the effects of community-wide, multi-strategic interventions upon population levels of physical activity.	Children, adolescents, adults; minimum six month follow-up	33 studies; 267 communities	Review	January 1994 -January 2014	Studies must include at least two interventions and one of the following: randomized controlled trials, quasi-experimental designs which use a control population for comparison, interrupted time-series studies, or prospective controlled cohort studies.	Multi-component community-wide interventions studied do not effectively increase physical activity for the population, although some studies with environmental components observed more people walking.	14 studies targeted deprived, disadvantaged, or low-SES communities.	Selection, performance, attrition, detection, and reporting biases.
Bleich et al., 2013	Evaluate community-based childhood obesity prevention programs in the United States and high-income countries. Interventions included modifications of diet, physical activity or sedentary activity, or a combination.	Children, ages 2-18; followed at least one year after baseline	9 studies; 52,960 children plus 24 schools	Review	2003 - August 11, 2011	Studies included randomized controlled trials, quasi-experimental studies, and natural experiments. All must report differences between intervention and control groups in weight-related outcomes. Studies targeting only overweight or obese subjects excluded.	4 of 9 studies achieved desirable changes in BMI or BMI z-score; moderate evidence that combined diet and PA interventions conducted in the community with a school component are more effective at preventing obesity or overweight. Studies that observed a significant decline in adiposity outcomes generally enrolled more participants and had longer follow-up periods, a focus on children middle school age or younger, inclusion of settings other than just the community, and less rigorous study designs.	NR	Suboptimal study designs may lead to biased results; publication bias; studies that included the community as a secondary component excluded.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Boelsen-Robinson et al., 2015	Evaluate effectiveness of whole-of-community (WOC) interventions by socioeconomic position and identify intervention characteristics likely to have an equitable effect. WOC interventions are defined as those targeting the weight status of a population characterized along geographical boundaries.	8 studies conducted among adults; 5 studies among children; study intervention duration ranged from 2-9 years	12 articles representing 13 different studies; international; N = 339-37,600	Review	1982 - 2013	Studies evaluated the effectiveness of WOC interventions on behavioral change measures, energy balance behaviors, and/or anthropometric outcomes according to any measure of SEP. Longitudinal and cross-sectional studies were included.	9 of the 10 WOC interventions were found to be more or equally effective in lower SES groups. WOC interventions are unlikely to increase SE inequalities in population weight, are effective at improving weight outcomes in children, and their effects are likely to be equitable on energy balance behaviors and/or adiposity outcomes for children and adults.	Interventions that are more or at least equally effective in low SEP populations include: changes to the environment where unhealthy behaviors occur (e.g. school lunches), presence of intervention components in more than three settings within a community, community engagement, and interventions that explicitly incorporate and/ or consider equity in their design and implementation.	Lack of methodologically rigorous reporting of WOC interventions by SEP; many analyses were not stratified by population subgroups such as adults and children or by indicators of SEP; publication bias; heterogeneity of SEP indicators used across studies.
Wolfenden et al., 2014	Assess the effectiveness of population-based whole-of-community (WOC) interventions in preventing excessive weight gain.	Children & adolescents; subgroup analyses based on age group (<5, 5-11 years old, 12-18 years old); duration ranged from 2-4 years	8 studies; US, New Zealand, Australia, Fiji, and Tonga; 112 schools	Review	1990-2011	Includes both randomized and non-randomized studies with a parallel control or comparison group; includes any population-based WOC intervention that primarily sought to prevent population weight gain, targeted more than one determinant of population weight gain, included community engagement in intervention development or delivery, and reported objectively measured indicators of adiposity.	7 of the 8 studies reported a positive intervention effect on at least one measure of adiposity, particularly among primary-school age children. Meta-analysis of six trials indicated a small reduction in the mean difference in BMI z-scores of intervention participants of -0.09 (CI -0.16 to -0.02).	NR	Absence of interventions targeting adults; limited diversity of intervention approaches hinders an examination of specific intervention features; selection bias of the intervention communities; attrition bias in longitudinal cohort designs.

School Interventions

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Stevens 2010	Identify existing obesity prevention programs for middle school age children and examine which programs apply interventions specific to ethnic minorities.	Children ages 10-14	8 studies; N= 9,621	Review	1998-2008	Studies included if obesity prevention intervention aimed to improve healthy behaviors through multi-component activities (e.g. both diet & PA) and were conducted in the last 10 years as this timeframe more accurately reflects the growing epidemic of obesity in ethnic minority children.	All studies showed modest results in increasing healthy eating and activity behaviors but no additional insight into which interventions work best specifically for ethnic minority children. Many studies suggest that obesity prevention interventions should be gender specific. Important factors for this age group include: behavioral strategies that increase self-esteem and motivation and target poor health practices, exposure to television or other sedentary behaviors, neighborhood safety, and parental inclusion in intervention programs.	The review failed to identify programs with effective interventions specific to ethnic minority children.	Prevention programs in school settings targeting youth at risk are inconclusive for children of ethnic minorities; school-based programs typically do not address neighborhood safety issues (a key concern for children of low income and ethnic minorities); publication bias.
Barrett et al., 2015	Estimate cost-effectiveness of a nationally implemented policy requiring that at least 50% of elementary school PE time is spent in moderate to vigorous physical activity (MVPA).	Children ages 6-11; 10 year projection	Simulation of the 2015 US population	Cohort model	Data analyzed in 2014 for 2015-2025 estimates	Intervention impact estimated using the best available evidence from relevant studies. A Markov cohort model followed children for 10 years without replacement. Shift in BMI, as well as related healthcare cost reductions, were evaluated. Costs were estimated in 2014 US dollars using a modified societal perspective.	After two years, this policy could reduce mean per capita BMI by 0.020 BMI units and increase MVPA time 16% over existing levels during PE. BMI reductions achieved would reduce healthcare costs an estimated $60.5 million, resulting in net costs of $175 million for policy implementation. Effect on BMI is small but costs fall within the benchmark of cost-effectiveness for interventions targeting youth suggested by Wu et al. (2011).	This intervention has the potential to increase income-related or racial/ ethnic disparities in obesity as PE is less likely to be provided in low-income or minority communities.	BMI reduction occurring after two years was assumed to persist for ten years which may be optimistic; modeling relies on assumptions that can limit conclusions.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Qian et al., 2015	Effects of the Fresh Fruit and Vegetable Program (FFVP), a nutrition assistance program that provides funding for the distribution of free fresh fruits and vegetables to students in participating schools, on childhood obesity.	Children in kindergarten, 2nd, 4th, & 6th grades	14 Arkansas treatment schools; total N= 48,637	Quasi-experimental	2007-2008 school year pretreatment period; 2008-2010 school years treatment period	First, difference-in-differences (DID) employed with matching methods to identify the effect of FFVP on children's BMI. Next, a synthetic control approach was used to compare the differences in overweight rate, obesity, and average BMI z-score between treated and synthetic control schools. The synthetic schools are weighted averages of elementary schools that did not participate in FFVP.	FFVP participating schools show a 3% decrease in obesity rate as well as a 1.8% reduction in overweight rate. Reductions in BMI and school level obesity rates that can be attributed to FFVP participation are large enough to be economically meaningful.	FFVP targets lower income children (at least 50% must be eligible for free or price-reduced lunches); food access, neighborhood SES, race/ethnicity, and free or reduced lunch participation status examined; lower-income schools may benefit from other measures that have been shown to increase FV consumption.	FFVP participation by school is not randomly assigned, therefore it is possible that schools self-selected into the program; FFVP targets lower income children already at higher risk for excess body weight; unobserved factors could influence both FFVP participation and obesity outcomes (school related health programs, parental factors).
Van Lippevelde et al., 2012	Determine the impact of parental involvement in school-based obesity prevention interventions in children and adolescents.	Children ages 6-18; study duration 6 weeks – 3 years	5 studies	Review	1990 – 2010	Controlled trials; all studies compared school-based obesity prevention interventions with and without a parental component. All studies reported effects on health behavior-related outcomes.	There is a lack of evidence to support the claim that parental involvement is important to improve effectiveness of school-based behavioral nutrition and PA interventions. The few studies available provide inconsistent evidence.	NR	Small number of studies; large differences in study designs and methodologies; not possible to assess parental participation levels; all studies in English and most in US.
Silveira et al., 2013	Evaluate effectiveness of school-based nutrition education interventions in reducing or preventing overweight and obesity among children and adolescents.	Children ages 5-18; study duration 4 months - 3 years	8 studies; 7 countries; N= 8,722	Review, meta-analysis	Earliest publication date through May 2012	RCTs conducted in schools to reduce or prevent overweight in children and adolescents with BMI as the primary outcome. Interventions were school-based nutrition education programs administered by health professionals or school teachers.	Average treatment effect of -0.33kg/m^2 (CI -0.55 to -0.11). School-based nutrition education is effective in reducing child and adolescent BMI regardless of the intervention components. Intervention duration is more important than the intervention components in achieving beneficial results.	NR	Observed changes would be more reliable if BMI z-scores had been used rather than BMI as the primary outcome; limited number of RCTs makes it difficult to evaluate intervention components.
Yildirim et al., 2011	Review the moderators of school-based interventions aimed at energy balance-related behaviors.	Children ages 4-18	61 articles; majority US & Europe; N= 122 to 5,106	Review	January 1990 – October 2009	Studies included RCT's or quasi-experimental controlled studies aimed at primary prevention of overweight, targeting dietary, PA, or sedentary behavior, and applying an appropriate test of moderation. Moderators included were experimentally manipulated, situational, personal, or psychosocial variables. Studies could contain home components. Studies that aimed to change preferences, taste, product sale, or content of school lunches were excluded.	School-based interventions tend to have stronger results in girls than boys and in those with more unfavorable baseline values; no other moderators were found to have consistent results. Interventions aimed at changing FV intake, PA, and fat intake were the most often affected by moderators.	Moderation analysis did not yield significant results for ethnicity or SES.	Most studies were limited in terms of their methodological quality; many studies conducted a stratified analysis of the intervention effect within each subgroup without an appropriate interaction test; the fact that many studies did not find a moderating effect could be explained by a lack of important moderators or too low power to detect a moderating effect.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Chriqui et al., 2014	Examine the potential influence of USDA Competitive Food and Beverage (CF&B) standards that took effect in the 2014-2015 school year by examining the relationship between existing state laws and/or district policies and student BMI and weight outcomes, as well as availability and consumption of CF&Bs.	Children, adolescents	24 studies	Review	January 2005-March 2013	Included studies were cross-sectional, longitudinal, or a combination. Qualitative studies, studies of self-reported policies, or studies examining broad policies without specific CF&B element were excluded. Studies were US-based, focused on the F&B environment and the effects of a formally adopted policy, and the relationship between that policy and BMI/ weight outcomes, student consumption, purchasing, and dietary intake, or in-school availability or access to CF&B's.	In most cases (15/24 studies), CF&B policies are associated with changes in consumption and/or availability in the expected direction. Influence on overall student consumption and BMI and weight outcomes was mixed.	NR	Nearly all studies were cross-sectional; randomized study designs were not possible, leaving questions as to both internal and external validity; lack of longitudinal studies; limited amount of time between policy enactment and study outcomes.
Sanchez-Vaznaugh et al., 2015	Examine the influence of competitive food and beverage policies on student weight outcomes and investigate disparities in the influence of CF&B policies on children's body weight by school neighborhood socioeconomic resources.	Fifth grade students	2,700,880 students from 5,362 public elementary schools in California	Cross-sectional	2001-2010	Comparison of overweight/ obesity trends before (2001-2005) and after (2006-2010) implementation of CF&B policies in public elementary schools in California.	Compared with the period before introduction of CF&B policies, overweight/ obesity trends changed in a favorable direction for all children across all neighborhood SE levels. However, improvement was greatest in schools in the most advantaged neighborhoods.	In the lowest income neighborhoods, the annual percentage change in overweight/obesity odds was 0.1% (CI -0.7 to 0.9) for females and -0.3% (CI -1.1 to 0.5) for males. In the highest-income neighborhoods, the annual decline in the odds of overweight/obesity was 1.2% (CI 0.4 to 1.9) for females and 1.0% (CI 0.3 to 1.8) for males.	Lack of randomization of student exposure to CF&B policies; extent to which trends may have been influenced by other policies could not be examined; lack of data on variation in the implementation of policies across schools and therefore students' actual exposure to them; unable to control for student-level SE factors or PA outside school.
Hoelscher et al., 2010	Compare the impact of two intervention approaches on the prevalence of child overweight and obesity. Coordinated Approach to Child Health BasicPlus (CATCH BP), an evidence-based coordinated school health program, was compared with CATCH BP and the addition of Community (BPC), in which BP schools received additional promotion of community partnerships.	4th grade students; duration 1 year	30 low-income schools; N= 1,107	Cross-sectional	Spring 2007-Spring 2008	15 low-income schools were selected to receive the BPC intervention while another 15 low-income schools received the BP intervention. Student BMI, PA, and diet were assessed in the 30 schools in Spring 2007 and 2008. No differences were found for mean age, gender distribution, % of economically disadvantaged students, academic achievement indicators, BMI, or % overweight or obese students in Spring 2007.	From Spring 2007 to Spring 2008, children classified as overweight or obese decreased 3.1% in BP schools, compared with 8.2% in BPC schools. BPC schools also reported more positive trends in dietary intake and activity behaviors. These results emphasize the importance of community involvement in child obesity prevention in low-income settings.	All schools recruited to participate were classified as low-income; of the students included, 61% were Hispanic and 14% were African American.	Use of a serial cross-sectional design rather than cohort; self-reported behavior measure; lack of no-intervention control group; potential bias in selecting BPC schools.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Slusser et al., 2013	This study evaluates the effectiveness of an after-school program at reducing rates of overweight and obesity, particularly among low-income children.	Children ages 8-9; duration 1 school year	8 study sites in Los Angeles County; N=121	Quasi-experimental	September 2008 -June 2009	4 sites designated as intervention group, 4 sites designated as control group; the study expanded on the Alhambra After-school Adventures program which was already in place, using the Catch Kids Club program to help teach students about nutrition and provide them with the skills to make healthy dietary and PA choices at school, in the community, and at home. Data was collected at baseline and in June assessing children's' dietary intake, nutrition knowledge, and physical activity. BMI was measured as well.	The proportion of children who were overweight or obese decreased by 3.1% in the intervention group versus 2.0% in the control group. No significant differences were found for other outcomes.	67.8% of children qualified for free or reduced-cost meals; diverse student population (52.1% Asian, 39.8% Latino/Hispanic, 3.9% White, 5.4% Other).	Small sample size may have limited detection of differences between intervention and control groups; PA questionnaire did not address PA during after-school program, a pedometer may be helpful in future studies; budget constraints eliminated possibility of 24-hour dietary recalls which could have enhanced dietary analysis; further research necessary to specify which pathways explain the decrease in BMI.
Hollar et al., 2010	Assess Healthier Options for Public Schoolchildren (HOPS)/ OrganWise Guys (OWG), an elementary school-based program designed to keep children at a normal, healthy weight and improve health status and academic achievement. Program includes modified dietary offerings, nutrition/ lifestyle educational curricula, a physical activity component, and wellness projects.	Children ages 4-13; 2 year duration	4 intervention schools, 1 control school; N= 3,769	Quasi-experimental controlled pilot study	2004 – 2006	Demographic, anthropometric, clinical, and academic data were collected each Fall and Spring over the two- year study period. Interventions included school menu modification, holistic nutrition and healthy lifestyle curricula for children, teachers, parents, and staff, increased PA, and other school-based wellness activities. Interventions were multi-sector, multi-agency collaborations.	Overall, BMI percentiles improved for intervention children with significant improvement versus control children (p= .007). There were statistically significant improvements in BMI, blood pressure, and academic scores particularly among low-income Hispanic and White children.	Secondary analysis focuses on children from low-income families, measured by a child's qualification for Free or Reduced Price Meals. These children (N= 1,197) significantly reduced their BMI z-score (p<.01) and their weight z-score (p<.05) over two years in comparison with the children from low-income families in the control school.	Researchers could not control eating or exercise habits outside of school; lack of study control over eating and PA during extended periods of out-of-school time; blood pressure measurements not taken in a clinical setting; study population not selected at random; study conducted in only one school district with only one control school; one component of the PA program discarded during study period; study design did not include assessment of intervention exposures (e.g. minutes of PA).
Shirley et al., 2015	Examine studies of combinations of obesity prevention programs in US elementary schools and evaluate effectiveness.	Children ages 6-12; duration 9 weeks – 3 years	12 studies, all prevention programs in US elementary schools; N= 7,178	Review	January 1st, 2007- December 31, 2012	All studies published in English; included school-based physical activity, education, and/or nutrition modification; were implemented in the US; utilized an experimental or quasi-experimental study design with a control group; measured BMI, percent body fat, and/or weight as a primary outcome.	Most studies of programs with two or three components reported statistically significant improvement; among single intervention strategies neither PA nor education alone demonstrated efficacy in reducing obesity; programs with community and parental involvement may increase effectiveness; outcomes following the cessation of a program showed a reversal of positive effects, suggesting the importance of long-term implementation.	10 studies did not focus on specific ethnic or racial backgrounds,two recruited only African American children; review did not examine results for equity in intervention effectiveness.	Differences in study designs made them difficult to compare and precluded the use of meta-analyses; extraneous factors (community safety, food outlets, average income) might have influenced program success; difference in demographics between studies not accounted for; no nutrition-only studies reviewed.

Johnson et al., 2012	Review of research addressing childhood overweight and obesity interventions in US elementary schools with large minority populations.	3rd - 6th graders; duration 12 weeks or longer	7 studies conducted in US; N= 11,240	Review	May 2009-August 2011	Studies limited to multi-school, multi-component interventions in schools with large minority populations; possible interventions included nutrition education, optimization of the school food environment, and PA.	Effectiveness was greater when program included specific objectives, was implemented across multiple school environments, extended into the community, and was culturally relevant; all alterations to school food environment improved dietary patterns in children of target schools; interventions that included a PA component were more effective than dietary intervention alone.	All interventions focused on minority school children; school PA programs may be especially important in minority populations as the school may be the only reliable source of PA facilities and they are often disproportionately exposed to television screen time in the home.	Limitations in measuring adiposity in children; important health behaviors may be positively influenced with no change in overweight or obesity.
Knowlden et al., 2013	Analyze school-based interventions targeting African American and Hispanic children.	School-age children; duration 3 months – 4 years	10 studies; US only; N=4250 and an additional 41 schools	Review	January 2001- May 2012	Experimental and quasi-experimental interventions targeting prevention of overweight or obesity in African American or Hispanic children in school settings and incorporating at least one anthropometric outcome variable.	Efficacy of school-based interventions targeting minorities can be enhanced through explicit operationalization of social and behavioral theories, incorporation of multiple layers of implementation process evaluation, long-term follow-up of intervention outcomes, cultural tailoring of programs, and inclusion of the family and home environment.	All studies targeted African American children, Hispanic children, or both.	Only three programs included process evaluation; more long-term outcome evaluations needed; publication bias.
Robinson et al., 2014	Assess effectiveness of pre-school and school-based obesity prevention and/or treatment interventions targeting healthy eating, PA or obesity in African American children and adolescents.	Children, adolescents; study duration 1 month – 3 years	17 articles; US only; N= 19,327	Review	January 1980- March 2013	Experimental studies targeting greater than or equal to 80% African American children and adolescents or studies whose results were stratified by race/ethnicity and that were conducted in pre-schools/Head Start or schools (excluding after-school programs); cross-sectional or purely observational studies excluded.	13 studies found significant improvement in nutrition, 3 found significant improvement in PA, and 2 found significant reductions in obesity in African American children. Best practices call for comprehensive, multi-level approaches across various aspects of the school environment.	All studies focused on African American children or included results stratified by ethnicity/race.	Small number of studies; differences in assessment approaches; lack of follow-up assessments; inclusion/exclusion criteria may have eliminated potentially relevant studies; studies that used a single group design or studies from the grey literature not included.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Holub et al., 2014	Review evidence-based, obesity-related interventions in the school setting targeting Latino youth.	Children ages 3-18; followed 1 week to 3 years	15 studies; sample must include at least 50% Latino participants or results stratified by race/ ethnicity; US only; N= 20 - 4,603	Review	1965-2010	All articles must include an intervention focused on obesity-related topics with obesity-related outcome measures as well as evaluate the intervention group in comparison with a control group or group exposed to varying degrees of the intervention. Includes interventions implemented in community or primary care settings (not laboratory) with intervention details published in a format with viable information for abstraction and quality evaluation.Interventions focusing on one-on-one health education or counseling in a healthcare setting excluded.	3 studies were able to demonstrate significant improvement in BMI or weight in the intervention group. Studies with promising results included multi-component interventions addressing nutrition, physical activity, and behavioral skills as well as some aspect of cultural tailoring.	Studies included an average of 70.1% Latino participants.	Focus on obesity-related measure as the outcome of interest (interventions that target nutrition and physical activity as the primary outcome may also impact obesity); other frameworks for gathering evidence may have resulted in a more expansive view (including studies that are promising or emerging); due to the variety in study designs and methodologies, effect sizes may not be comparable.
Driessen et al., 2014	Review evidence for the effect of isolated food environment interventions on food-related behaviors (purchasing, consumption) and body weight.	Children, adolescents	18 papers; US and UK	Review	2008-November 2013	Only studies reporting results of interventions targeting school food environment in isolation or those with a mechanism to evaluate the effect of food environment changes separately. Those providing free or subsidized food were excluded because of reliance on constant financing (low-cost changes may have potential to be more sustainable). Outcomes must include anthropometric measurements and eating-related behaviors; any design or duration.	17 of 18 studies reported positive outcomes in either BMI or healthfulness of food sold or consumed; changes to school food environment can be effective even without simultaneous education or promotion activities.	NR	Findings may not translate easily to settings with no government lunch program or where government programs exist but are not privatized; variability in study design.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Khambalia et al., 2012	Examine and compare findings from existing systematic reviews and meta-analyses of school-based programs in the prevention and control of childhood obesity.	School-age children, adolescents	8 reviews total (3 meta-analyses & 5 systematic reviews)	Review	January 1990-October 2010	Participants were school-based children, study design had to be a review paper with sufficient reporting of methodological details to allow critical appraisal of study quality, and reviews considered individual studies examining behavioral interventions for preventing or controlling overweight or obesity (including PA, dietary behaviors, or a combination of these approaches). Reviews that only included individual research studies examining a single behavioral intervention or single geographic setting were excluded.	Intervention components in the school setting associated with a significant reduction of weight included long-term interventions with combined diet, PA, and family components. Several reviews found gender differences in response to interventions.	NR	Only English peer-reviewed systematic reviews included; lack of sufficient evidence to make policy recommendations; among included reviews there was a lack of reporting on policy and environmental strategies.

Policy Interventions

Klerman et al., 2014	To test the ability of the USDA Healthy Incentives Program (HIP) to increase consumption of fruits and vegetables in SNAP participants.	Households participating in SNAP; outcomes measured in adults; study duration 9-11 months, this article examines results at 4-6 months after initiation	2,081 households; Hampden County. Massachusetts	Quasi-experimental	2011 - 2012	HIP participation was randomly assigned, providing households already participating in SNAP with a 30% incentive on purchases of specified fruits and vegetables.	The HIP group experienced a self-reported increase in daily fruit and vegetable intake of 24.5% when compared with traditional SNAP participants but intake levels were still below recommendedations. The program provides a promising strategy for moderate increases in fruit and vegetable intake.	All participants living in SNAP participating households.	Much larger sample size needed to estimate impact and corresponding elasticity; study results used to project impact of universal and permanent HIP-like program create imperfect estimates.
Sonneville et al., 2015	Effect of a national intervention eliminating tax subsidies for television advertising of nutritionally poor foods and beverages to children.	Children ages 2-19, adults; 10 year projection	Simulation of the 2015 US population	Cohort model	Data analyzed in 2014 for 2015-2025 estimates	Review conducted on relationship between screen time reduction and child BMI to model how policy would affect advertising time and BMI. Short-term effects on BMI and 10-year healthcare expenditures were estimated using a Markov cohort model. Cost of implementation estimated from a modified societal perspective.	At full effect (after 2 years) the intervention would reduce mean BMI by 0.028 units among children ages 2-19 (a 0.30% reduction in obesity prevalence). The intervention would generate approximately $80 million in tax revenue per year.	Low-income and racial/ ethnic minority children would potentially benefit more as they tend to spend more time watching TV.	No RCTs capture the relationship between tax policy, children's exposure to TV advertising, and impact on BMI; uncertainty of estimates used in model; 10-year results based on assumption that intervention effect is maintained.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Long et al., 2015	Estimate health and economic benefits of a national sugar-sweetened beverage excise tax of $0.01/ounce over 10 years.	Children ages 2-19, adults; 10 year projection	Simulation of the 2015 US population	Cohort model	Data analyzed in 2014 for 2015-2025 estimates	Intervention modeled on recent proposals under consideration in various levels of government. Effects of SSB tax on consumption and BMI reviewed. A Markov cohort model simulated the 2015 population over 10 years, estimating changes in BMI and differences in healthcare expenditures. Cost of implementation estimated from a societal perspective.	The tax would cost $51 million to implement nationally in the first year. It would reduce SSB consumption by 20%, reduce mean per capita youth BMI by 0.16 units, and decrease prevalence of obesity in youth by 1.38%. The tax would result in $23.6 billion in healthcare cost savings over 10 years and would generate $12.5 billion in annual revenue.	Potential for a relatively higher tax burden among low-income households, but research indicates that SSB taxes also pose greater potential benefits to African American children and children in low-income households.	Potential impacts of intervention not evaluated by race/ethnicity, income level, or weight status; limited evidence with which to estimate tax effects for some model variables; lack of studies evaluating relationship between SSB intake and BMI.
Elbel et al., 2011	Child and adolescent fast-food choice and the influence of calorie labels in low-income communities.	Children ages 1-17; data collected before mandatory labeling and 4 weeks after labeling went into effect	N= 349	Natural experiment, cross-sectional	July 2008 – August 2008	Data was collected from low-income areas of New York City and Newark, New Jersey before and after mandatory labeling began in NYC. Study restaurants included 4 of the largest chains in the area.	No statistically significant differences in calories purchased before and after labeling were found. More than 50% of adolescents reported noticing the calorie labels but less than 10% reported considering the information when ordering.	Sample drawn from low-income areas of NYC and Newark; 90% of sample were from racial or ethnic minorities.	Short study period; instability in label formatting when policy was first implemented; the sample is too small to register small effects of labeling.
Ludwig et al., 2013	Examine the long-term effects on low-income parents and children of moving to less distressed neighborhoods.	Children, adolescents, adults; study duration 10-15 years	4,604 low-income families in 5 large US cities	Longitudinal, experimental	1994-2010	Between 1994 and 1998, the US Department of Housing and Urban Development's (HUD) Moving to Opportunity (MTO) program recruited low-income families and provided them with the following: housing vouchers that could only be used in low-poverty areas (experimental group), unrestricted traditional vouchers (Section 8 group), or no assistance through MTO (control group). Long-term effects measured between 2008 and 2010.	Physical health improved for girls in both experimental and Section 8 groups; effects on health outcomes for boys ranged from no improvement in health to worse health.	All participants were low-income families living in public housing in high-poverty neighborhoods.	Results may lack generalizability as MTO families were drawn from extremely distressed communities; reason for differences in outcome by gender remain unclear.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Fortson & Sanbonmatsu 2010	Estimate the direct effects of housing and neighborhood quality on child health using data from the Moving to Opportunity randomized housing voucher experiment.	Children ages 6-14; adolescents ages 15-20; minimum duration 5 years	4,608 families from high-poverty neighborhoods in Baltimore, Boston, Chicago, Los Angeles, & NYC.	Longitudinal, experimental	1994-2002	Low income families recruited into the program randomly assigned to the experimental treatment group, Section 8 treatment group, or control group. The experimental group received vouchers that could only be used in low-poverty neighborhoods, Section 8 families received housing vouchers without geographic restriction, and control families received neither but were eligible for public housing.	Five years after random assignment, housing mobility had little impact on children's overall health status, asthma, injuries, or BMI. Observed effects suggest that receiving a voucher may worsen some aspects of child health for both treatment groups, especially for children ages 11-15 and youth ages 16-20.	Only very low-income families accepted; participants were approximately 30% Hispanic and 64% African American.	Null and adverse effects may reflect inadequacy of health outcome measures; the experiment's implications on how neighborhoods influence health may be limited (their influence may operate more slowly than the scope of this study); the MTO program may not have affected particular housing and neighborhood characteristics that are important for child health.
Kimbro & Rigby 2010	Relationship between food assistance programs and BMI in young, low-income children.	Children ages 3-5 and parents; 5 year duration	681 pairs of children and mothers; recruited from 20 large American cities with varied costs of living	Longitudinal	1998-2004	Used data from the Fragile Families and Child Wellbeing Survey and In-Home Longitudinal Study of Pre-School Aged Children. Data collected at birth and ages 1, 3, and 5. Sample was limited to low-income children at ages 3 and 5. Results stratified by family income level, type of food assistance program, city food prices, and other factors.	No significant relationship between food assistance and child BMI in full sample, but, when looking at particular forms of food assistance, significant beneficial influence was found for subsidized meals at school or day care. Food assistance may contribute to childhood obesity in cities with high food prices, particularly for those participating in SNAP.	Study limited to children whose family income was below 185% of the federal poverty level.	Other factors may influence the relationship between federal food assistance and childhood obesity, such as food availability, housing density, and local farmers markets.
Reat et al., 2015	Investigate whether dietary intake and feeding practices among toddlers and infants improved after changes to the WIC package.	Children ages 4 months - 2 years	Data collected from 84 caregivers in 2009 and 103 caregivers in 2011; majority were Hispanic infants and toddlers participating in a WIC clinic in south central Texas	Observational, cross-sectional	Data collected in 2009 (before the package change) and again in 2011 (after the package change)	Feeding practice data and 24 hour recalls were collected during telephone interviews with caregivers. Outcomes for the 2 study years compared using Chi square analysis for categorical and Mann-Whitney U analysis for continuous variables.	Breastfeeding initiation, breastfeeding duration, age of introduction of complementary foods, and exposures to baby food, fruits, vegetables, and meats among infants did not improve after package changes. These practices did not reflect the WIC package changes.	Sample participated in a WIC clinic and the majority of participants were Hispanic.	Use of a convenience sample and relatively small sample size, thus results may not be generalizable to the population studied.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Gortmaker et al., 2015	Analyze methods, outcomes, and cost-effectiveness of four childhood obesity interventions: 1) SSB tax 2) eliminating tax subsidy for TV ADs geared toward children promoting nutritionally poor food and beverages 3) changes to early care and education policies (ECE) 4) active physical education (Active PE)	Children, adolescents, and adults, projected 10 years	Effects estimated for simulated cohort representative of the US population	Cost-effectiveness modeling	Simulation spanned from 2015-2025	Four interventions selected to represent a broad range of nationally scalable strategies to reduce childhood obesity; intervention effects on BMI estimated using an evidence review process; a Markov cohort simulation model was developed for calculating costs and effectiveness through impact on BMI changes.	All the interventions except for Active PE would result in a potential net cost savings over the 2015-2025 time period; the SSB tax and TV AD intervention would generate tax revenue; the SSB tax could reduce child BMI up to 0.16 units per person.	All 4 interventions examined from an equity standpoint: SSB tax found to be neutral but has potential for earmarking of tax revenue to offset the effects of its regressivity, TV AD intervention has potential to reduce inequality, ECE policy changes have potential for reducing or increasing disparities, and Active PE has potential to increase inequalities.	None of the interventions have been implemented at the national scale; lack of knowledge on how to effectively translate and scale these interventions in community settings throughout the nation; impact of interventions may be underestimated; 10-year time horizon may underestimate long-term healthcare cost savings and reduction in morbidity/mortality.
Kristensen et al., 2014	Estimate impact of three federal policies on childhood obesity prevalence in 2032, after 20 years of implementation.	Children ages 6-12 & adolescents ages 13-18	Simulated sample with demographic characteristics matching that of 2010 US census data	Microsimulation analysis	January 2000- July 2012	Literature review used to gather evidence of effectiveness and to create average effect sizes for each policy. A Markov microsimulation model estimated each policy's impact on diet or PA and then BMI, simulated in a school-aged population in 2032.	The microsimulation predicted that afterschool PA programs would reduce obesity the most among children ages 6-12 (1.8 percentage points), the SSB excise tax would reduce obesity the most among adolescents ages 13-18 (2.4 percentage points), and the advertising ban would reduce obesity the least (0.9 percentage points). All three policies would reduce childhood obesity prevalence by 2032; however, a national $0.01/ounce SSB excise tax is the best option.	All three policies would reduce obesity more among Black and Hispanics than Whites; the SSB excise tax would reduce obesity disparities the most.	Modeling childhood obesity is challenging and data may be insufficient to predict association between changes in behaviors and changes in BMI z-scores; there is little effectiveness data for the SSB and advertising policies and existing data often come from observational studies; in the absence of substitution effects in food consumption resulting from an advertising ban, it was assumed that a lower-calorie meal would be available and consumed instead; inability to assess interaction effects among the three policies or with existing policies.
Kumanyika et al., 2014	Evaluate applicability to Black Americans of policy and environmental strategies for childhood obesity prevention and assess external validity. 15 intervention types were included, all relating to nutrition or physical activity.	Children, ages 3-18; some studies of adult subjects included if they had the potential to affect children, families, or community	396 study groupings encompassing 24 intervention strategies	Review	January 2000-May 2009	Studies must include information on both environmental or policy variables and data on an outcome related to diet/ nutrition, PA, sedentary behavior, or overweight/ obesity; randomized and non-randomized controlled trials, longitudinal studies, 'before and after' intervention studies, cross-sectional, and descriptive studies included.	Small but consistent body of evidence that physical activity interventions in school and after-school settings are effective for African American children. No other conclusions could be drawn as to the effectiveness of other primary review findings in Black populations.	Secondary evaluation for applicability to Black children using the 33 study groupings with more than 50% African Americans or findings separated for Blacks. These encompassed 15 of the original 24 interventions.	Publication bias; few Black participants in study samples; lack of information about participants' race/ ethnicity; sampling approaches may limit external validity; when Blacks are included in study sample, subgroup analyses is often missing.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Powell et al., 2013	Evaluate price elasticity of the demand for SSBs, fast food, fruits, and vegetables and the direct associations of prices/taxes with body weight outcomes in order to assess taxes and subsidies as potential policy instruments to improve consumption patterns and related health outcomes.	Children, adolescents, and adults	41 studies; US; N = 180,866	Review	January 2007-March 2012	Included studies are peer-reviewed, provide original quantitative evidence on the relationship between prices/ taxes/subsidies and weight, are not intervention or pilot studies, assess demand for product categories rather than brand, and contain direct estimates for weight outcomes (no modelling studies drawing on price elasticity estimates to derive simulated impacts on weight).	Price elasticity was estimated to be: +1.21 for SSBs, -0.52 for fast food, -0.49 for fruits and -0.48 for vegetables. Soda taxes show minimal impacts on weight (based on existing state-level sales taxes which are relatively low); higher fast-food prices are associated with lower weight outcomes particularly among adolescents; lower fruit and vegetables prices are generally associated with lower body weight outcomes.	Evidence suggests that fruit and vegetable subsidies would have the greatest effect on improving weight outcomes among low-SES children and adolescents. Higher fast-food prices are significantly associated with lower weight outcomes, particularly in low and middle SES adolescents.	Cross-sectional estimates often overestimate associations; many price elasticity estimates derived from household-level or time series data which does not provide differential impacts by age group.
Mayne et al., 2015	Evaluate the efficacy of policy and built environment changes on obesity-related outcomes (BMI, diet, or PA).	Children, adolescents, adults	37 studies; majority in US; other studies are from Australia, the UK, Canada, Chile, and New Zealand	Review	January 2005-December 2013	Natural and quasi-experiments; includes longitudinal, cross-sectional, and time series studies both with and without comparison groups; studies must include an intervention that was a natural event due to new policy or change to the built environment; study must have collected data on obesity-related outcomes (BMI, weight, diet, or PA).	Nutrition-related studies find greater effects due to bans/restrictions on unhealthy foods, mandates offering healthier foods, and modifying payment rules using low-income food vouchers. Physical activity-related studies find stronger impacts when interventions involve improvement to active transportation infrastructure (walking, biking). Few studies assessed impacts on BMI/ weight. Studies with positive results generally had longer follow-up times (>6 months).	Two studies on nutrition after changes in the quality of foods that can be purchased with low-income food vouchers found healthier foods within the home, modest within-person improvements in diet, and more purchases of fruits and vegetables and use of farmers markets. Two studies evaluating impacts of self-reported fruit and vegetable consumption after opening a large supermarket in a food desert found no significant impact.	Only three studies directly assess BMI or weight, only one observing a significant effect on BMI; weaker study designs found to be more likely to report positive associations; many studies report favorable impacts only on assessed process outcomes rather than overall diet or PA.
Thow et al., 2014	Evaluate effects of food taxes and subsidies on consumption of healthy food and beverages.	Children, adolescents, adults	43 reports representing 38 studies; international	Review	January 2009-March 2012	Studies must be based on empirical data (thereby excluding reviews, commentaries, and editorials), examine a tax or subsidy targeted to influence the price of a specific food product or nutrient, and assess the effect of the tax on food and/or nutrient consumption. Includes RCTs, modeling studies, stated preference studies, and grey literature.	All studies on subsidies for healthy foods found an increase in consumption of targeted foods of at least half the magnitude of the tax applied but effect on total calorie intake is unclear; all studies on SSB taxes showed a reduction in consumption proportional to the taxes applied; taxes on individual nutrients reduced consumption by 0-8%; most studies of food taxes based on nutrient profiling for 'unhealthy' foods reduced purchase and consumption of target foods.	Some studies find that taxes are a greater burden for low-income earners (regressivity) while others show greater positive dietary effects on low-income consumers when taxes target noncore foods.	Studies restricted to English language; lack of studies from low and middle-income countries; limited by focus on assessments of fiscal policy interventions which may exclude relevant studies focusing on price.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Faulkner et al., 2011	Evaluate the existing evidence regarding the impact of economic policies targeting obesity and its causal behaviors (diet and PA).	Children, adolescents, adults	38 studies and 7 reviews	Review	December 2009- May 2010	All studies are observational or RCTs; studies focus on financial measures as the central intervention and specifically focus on weight outcomes, PA, or caloric intake.	Weight outcomes are consistently responsive to food and beverage prices; very few studies examine the impact of economic instruments to promote PA; panelists agreed that modifying agricultural support polices and food subsidies to lower prices and increase availability of fresh fruits and vegetables is the most important priority. It is likely that policies need to be implemented in the face of an incomplete evidence base.	Fruit and vegetable subsidies as well as the implementation of a tax on caloric sweetened beverages are promising for targeting children and low-income households.	The Delphi method was used by a panel of experts to review evidence; a different panel may reach different conclusions.

Technology-based Interventions

Lamboglia et al., 2013	To evaluate the use of "exergaming", the combination of interactive video games and physical exercise, as a strategic tool for the promotion of healthy behaviors in the fight against childhood obesity.	Children ages 6-15; study duration 4 weeks or longer	9 articles; N= 520	Review	January 2008 – April 2012	Studies limited to scientific papers in Portuguese and English and must be cross-sectional and experimental, evaluate energy expenditure during exergaming, discuss the association between active games and health behavior, and quantify changes in the level of PA, body composition, musculoskeletal system, and cardiovascular system. Studies that focused on the use of exergaming for rehabilitation or cognitive therapy were excluded. No grey literature included.	Exergaming was found to lead to a more active lifestyle by increasing the level of PA, energy expenditure, and cardiorespiratory function and reducing fat and sedentary behaviors. Exergaming appears to have considerable potential as a tool to fight childhood obesity but more research is required.	NR	Small number of articles met inclusion criteria due to the novelty of the concept; absence of statistical analysis.
Whittemore et al., 2013	To describe, synthesize, and evaluate the research on school-based internet obesity prevention programs for adolescents.	Adolescents ages 12 – 18	12 studies; N= 5,974	Review	January 1995 – August 2012	Studies were included if they reported on an empirical study of a school-based obesity prevention program for adolescents, evaluated BMI, nutrition behavior, or PA behavior, and had a comparison group. Studies were excluded if they included samples of youth younger than middle school and if they targeted obesity treatment.	The majority of studies were effective in improving health behaviors in the short term (<3-6 months). Ten programs resulted in positive obesity-related outcomes, however, only seven demonstrated positive outcomes in the internet group compared to a control group. Only four studies evaluated the program's effect on BMI: one found a significant decrease in BMI over time. one found an increase in BMI over time, and the other two found no effect.	Seven studies provided data on race/ethnicity, with an overall average of 64% non-White participants.	Studies included in the review had an unclear or high risk of bias; quality of evidence is moderate; poorly described interventions contribute challenges in the interpretation of results; description of the interactivity capability of the internet incorporated in the program was only provided in a few reports; insufficient information on the process of implementation; majority of prevention programs are brief; majority of authors did not examine potential moderators.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Nguyen et al., 2011	Qualitative comparison of interactive electronic media interventions for the prevention or treatment of obesity and/ or obesity-related behaviors in children and adolescents.	Children & adolescents	24 studies; N= 4,882	Review	Earliest publication date through March 2010	Included studies with interactive electronic interventions delivered as either adjunct or sole interventions for the prevention or treatment of obesity and/or obesity related behaviors in children and/or adolescents. Interventions targeted nutrition, PA, and/or behavioral therapy; no restrictions on type of study design.	11 of 15 studies with adiposity measure outcomes reported positive changes. Most studies suggest that interactive electronic interventions, used as adjunct or stand alone programs, positively influence obesity-related outcomes including dietary behaviors, reported and measured PA, and psychosocial variables.	Two of the prevention interventions studied in children reported positive outcomes in predominantly minority populations; most studies were conducted in ethnically diverse populations.	Most studies did not separate the effects of interactive electronic media from other intervention components and showed poor overall study design quality; heterogeneity in study designs, settings, sample characteristics, intervention components and outcomes precluded a quantitative analysis of intervention impact.
Nollen et al., 2014	To test a mobile technology application's effect as a stand-alone intervention on fruit and vegetable consumption, SSB consumption, screen time, and BMI among racial and ethnic minority girls.	Children ages 9-14; duration 12 weeks	51 low-income, racial/ethnic minority girls	RCT pilot study	March 2011- July 2012	The mobile intervention prompted real-time goal setting and self-monitoring, as well as providing tips, feedback, and positive reinforcement related to target behaviors. Control subjects received the same content in a written manual but no prompting. Outcomes included device utilization and effect size estimates of FV's, SSB consumption, screen time, and BMI.	Girls in the intervention group experienced an increase in FV intake and decrease in SSB intake with an adjusted difference from the control group of +0.88 servings and -0.33 servings per day, respectively. The difference between groups was not statistically significant but indicated small to moderate effects of the intervention. No statistically significant differences observed for screen time or BMI.	All participants recruited from economically disadvantaged neighborhoods.	Small sample size; 12 weeks may not be long enough to observe changes in BMI; due to the program's focus on short-term behavior change, maintenance of target behaviors and impact on BMI should be examined in a fully powered trial; reward system intrinsically linked to the mobile app; maintaining long-term interest in technology-delivered apps remains a challenge.
Smith et al., 2014	Evaluate the impact of the Active Teen Leaders Avoiding Screen-time (ATLAS) intervention for adolescent boys, an obesity prevention intervention using smartphone technology.	Children ages 12-14; duration 20 weeks	361 adolescent boys from 14 secondary schools in low-income communities in New South Wales, Australia; boys failing to meet international PA or screen-time guidelines were considered eligible to participate	Cluster randomized controlled trial	December 2012 - June 2013	This multi-component intervention included a smartphone app and website as well as teacher professional development, provision of fitness equipment to schools, face-to-face PA sessions, lunchtime student monitoring sessions, researcher-led seminars, and parental strategies for reducing screen-time. Outcome measures included BMI, waist circumference, percent body fat, PA (accelerometers), screen-time, SSB intake, muscular fitness, and resistance training skill competency.	The intervention did not result in significant effects on overall body composition, perhaps due to an insufficient activity dose. For those who were overweight or obese at baseline, there was a trend in favor of intervention participants for all body composition outcomes. Significant effects found overall for upper body muscular endurance, resistance training skill competency, self-reported screen time, and SSB consumption.	All participants recruited from schools in low-income communities.	BMI is considered a suitable measure of change in adiposity but other direct measures can provide more accurate assessments of body fat; social desirability bias cannot be ruled out in assessment of screen-time and SSB consumption; study unable to collect ATLAS app usage data, preventing examination of this component's efficacy; poor compliance to accelerometer protocols reduced available sample size; due to targeted intervention nature, results may not be generalizable.

Early Childhood Interventions

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Wright et al., 2015	To quantify the health and economic impacts of implementing a policy regulating beverage changes, PA, and screen time in licensed US childcare facilities.	Preschool-aged children; short-term effects on BMI and 10-year cost analysis	Simulation representative of 2015 US population	Cohort model	Data analyzed in 2014 for 2015-2025 estimates	The hypothetical policy intervention was based on current recommendations and initiatives. A Markov simulation model was used to predict changes in BMI resulting from the intervention over 2 years. This data was then used to project future obesity rates and related healthcare costs over 10 years.	The one year projected change in BMI was 0.0186 kg/m2 per eligible child with a 94.7% chance that BMI changes would result in a cost savings over 10 years due to reduced obesity-related healthcare costs. Total cost of implementation in the first year is under $2 per child, while other school and community-based childhood obesity interventions range from $15 to $839 per child.	This intervention may improve equity by imposing the same standards across childcare facilities.	Total intervention impact estimated as a sum of intervention components (effects may not be independent); state-level regulatory policies were considered when calculating hypothetical intervention impact rather than actual facility policies; limitations related to existing evidence such as effectiveness estimates; scarcity of literature directly linking policy changes to BMI outcomes.
Bender & Clark, 2011	Evaluate the type and extent of cultural adaptation strategies applied to child obesity interventions and how these adaptations relate to study outcomes in US ethnic minority preschool children.	Children ages 2 - 5	10 studies; US only; N= 2,245	Review	2000-2010	Childhood obesity intervention studies specifically targeting ethnic minority preschool children; studies not identifying the specific ethnic groups participating excluded; no limits on study design.	Results indicate a relative absence of appropriately adapted obesity interventions for ethnic minority groups; culturally appropriate adaptations appeared to enhance intervention relevance, effectiveness, and feasibility in association with the extent to which they were employed.	All studies specifically target ethnic minority preschool children.	Lack of rigor in study designs can affect study outcomes; most studies were not RCTs and therefore influences from confounding variables were difficult to identify or control. Inadequate cultural adaptation of interventions may have resulted in non-equivalent measures, further cultural adaptation may enhance relevance of interventions and outcomes for minority ethnic groups. Influences of adaptation strategies very hard to assess, other factors may be influencing outcomes.
Sekhobo et al., 2014	Examine changes in childhood obesity prevalence among low-income children in NYC in relation to NYC Article 47 regulations which require licensed childcare centers to improve nutrition, PA, and television-viewing behaviors of enrolled children.	Children ages 3-4	1,914 children enrolled in the Michigan Head Start Program (14 sites, both urban and rural)	Ecologic time-trend analysis	Study conducted before (2004-2006) and after (2008-2010) implementation of regulations in 2007	An ecologic, time-trend analysis was used to compare 3-year cumulative obesity prevalence during the periods from 2004-2006 and 2008-2010. Outcome data obtained from the NYS component of the CDC's Pediatric Nutrition Surveillance System which monitored the height and weight of all preschool children enrolled in WIC in NYS during the study time frame.	Average annual change in obesity prevalence in high-risk neighborhoods from 2004-2010 was -2.6% versus -1.6% in low-risk neighborhoods. The highest annual change was seen in Manhattan high-risk neighborhoods, -4.7%. Results showed a narrowing of the gap in obesity prevalence between high-risk and low-risk neighborhoods in Manhattan and the Bronx but not in Brooklyn.	All children enrolled in WIC; results also compared in terms of high-risk and low-risk neighborhoods. Data included racial/ethnic distributions.	Findings cannot be used to draw causal inferences at the individual level; not possible to assess whether changes in the makeup of racial/ethnic subpopulations contributed to changes in obesity prevalence; cannot rule out the effect of more children who are not at risk for obesity enrolling in WIC as a result of the economic downturn; not able to assess effects of expanded DPHO activities during this time.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Bond et al., 2011	Effectiveness and cost-effectiveness of weight management schemes for children five and under.	Children ages 0-5; study duration 16 weeks – 5 years	4 RCTs; N= 1,655	Review	1990 – 2009	Controlled trials, RCTs, and non-randomized controlled designs focusing on weight management in any setting with at least one measure of adiposity.	Aside from the African American subgroup of Hip-Hop Jr., no studies showed statistically significant differences in weight measures when compared with a control group. The Latino subgroup of Hip Hop Jr. also showed trends toward improvement in BMI levels compared with the control group.	The Hip-Hop Jr. subgroup which focused on African American children found, at 24 months, an increase in mean BMI for the intervention group of 0.48 (SD 0.14) kg/m2 compared with an increase of 1.14 (SD 0.14) kg/m2 in the control group.	No studies fit inclusion criteria that evaluated cost-effectiveness or focused on treatment of overweight or obesity; search limited to the English language. Search only went back to 1990.
Larson et al., 2011	Review of the scientific literature on state regulations, practices, policies, and interventions for promoting healthy eating and PA as well as preventing obesity in preschool-aged children attending childcare.	Preschool-aged children	42 studies; most from U.S., but some international included	Review	January 2000 – July 2010	Included articles focused on preschool children enrolled at childcare centers or family childcare homes with an evaluation of program impact or feasibility.	There is evidence of opportunities to improve the nutritional quality of food, increase amount and quality of PA time, improve caregiving that may discourage healthy behaviors, and embrace missed education opportunities. Most states lack strong regulations for childcare settings related to healthy eating and PA. More well-designed studies are needed to inform effective implementation.	NR	Studies would be strengthened with stronger designs, assessments of body composition or weight status, and more reliable outcome measures.
Zhou et al., 2014	Systematic review of controlled trials of obesity prevention interventions in childcare settings.	Preschool-aged children	15 studies	Review	January 2000 – April 2012	Studies focused on childhood obesity prevention interventions in childcare settings using both intermediate outcomes (e.g. dietary intake, PA) and the final outcome (adiposity).	These studies used a variety of different intervention strategies and had mixed success in improving adiposity and diet- and PA-related behaviors. 7 of 15 studies reported improvements in adiposity.	NR	Several studies had short intervention duration and a short follow-up time period, which may have limited their ability to achieve sufficient intervention exposure and/ or sufficient follow-up time to be able to detect changes in adiposity beyond any intermediate behavioral changes. Studies included a large variety of measures for the secondary outcomes of dietary or PA behaviors.
Lumeng et al., 2010	Evaluate the effects of Head Start enrollment on child BMI. Head Start is free to children living below the federal poverty line to improve school readiness; it provides mandated nutritional/ health services, adequate time and space for active play, and includes parental involvement.	Children, ages 3-5; followed >2 academic years and intervening summer after baseline	1,914 children enrolled in the Michigan Head Start Program (14 sites, both urban and rural)	Longitudinal	Fall 2001 – Fall 2006	Study used retrospective longitudinal growth data collected over five academic years; Head Start policy requires teachers to weigh and measure each child periodically; anthropometric data provided annually by healthcare providers; the Head Start program was not conducting any specific interventions for obesity or nutrition.	Mean BMI z-score at enrollment was 0.52 (CI 0.39 to 0.65) with a nonsignificant decline in the first year at a rate of -0.07 units (CI -0.28 to 0.14), a nonsignificant increase over the summer at a rate of 0.62 units (CI -0.0005 to 1.23) and a significant decline by the end of the second year at a rate of -0.82 units (CI -1.50 to -0.13). Findings were most robust for minority girls.	94% of children had family incomes below federal poverty level; the remaining 6% were eligible due to a disability.	Replicability in other geographic areas is uncertain; anthropometric measurements were not collected by Head Start staff specifically for this study; change in height considered as possible reason for decrease in BMI however no significant changes in height z-scores found.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Laws et al., 2014	Systematic literature review examining the effectiveness of interventions to prevent obesity or improve obesity-related behaviors in children 0-5 years from socioeconomically disadvantaged or indigenous families.	Children ages 0-5; 10 week – 8 year duration	32 studies; most in US & Europe; N= 10,191	Review	1993 - November 2013	No limitations on length of follow-up, study design, or study quality. Studies focused on healthy children from SE disadvantaged or indigenous families targeting prevention of unhealthy weight gain and/ or obesity-related behaviors. Studies including both high and low SE groups included if findings were stratified. Studies reported on one or more of the following: anthropometric measures, diet, feeding practices, PA, or sedentary behaviors. Studies recruiting only overweight or obese children excluded.	Mean differences between intervention and control groups ranged from -0.29 kg/m2 to -0.54 kg/m2 for BMI and from -2.9% to -25.6% for overweight/ obesity prevalence. Interventions initiated in infancy (under 2 years) had a positive impact on obesity-related behaviors but few measure the long-term impact on healthy weight. Findings among preschoolers (3-5) were mixed.	14 studies were conducted among racial minority groups, with Hispanic/ Latino low-income families being the most commonly studied. Only 2 studies could be found that were conducted among indigenous populations.	Less than 10% of studies were high quality; publication bias; studies limited to English over the last 20 years; the search strategy focused on studies targeting SE disadvantaged or indigenous children and may have missed studies that did not report on SE status; it was not possible to conduct a meta-analysis due to heterogeneity in study populations.

Comparing Multiple Intervention Types

Thury & Matos, 2015	Outline current childhood obesity measures and discuss programs that have been successful in reducing childhood overweight and obesity.	Children	NR	Review	July – September 2014	Systematic reviews or RCTs regarding the prevention of childhood obesity. Studies that focused on treatment were excluded.	Research demonstrates that there is a benefit to programs that focus on collaboration between the community and school, primary health care, and home/family and involve both PA and a dietary component. Efficacy is increased with longer duration and program initiation in children of middle school age or younger.	NR	Paucity of quality studies; majority of studies examine school-based interventions.
Suarez-Balcazar et al., 2013	Analyze the literature on evidence-based culturally competent strategies for addressing and preventing obesity among African American and Latino youth as well as discuss roles for occupational therapists working with populations at risk for obesity in the school or therapeutic clinical environment.	Children	89 articles; US	Review	2000-2010	Included articles described interventions conducted in schools and communities targeting African American and Latino children. Articles reviewed by relevance with priority given to articles or meta-analyses that related to culturally modified interventions for obesity prevention or identification of specific issues relating to minority communities. Articles were excluded if the research was conducted outside the US.	Effective strategies include a high level of cognitive and behavioral cultural competence on the part of health professionals as well as including culturally competent organizational and contextual components in interventions. Other strategies, in addition to PA and nutrition education, include wellness programs that employ culturally and linguistically appropriate strategies, use a holistic approach that goes beyond nutrition and PE, and include components such as support groups and ongoing social and educational programming.	Strategies that work well for Latino children include exercise programs that use the elements of folk music and dance, PA centered around traditional values in Latino families, and interventions in Spanish that reflect the literacy level of the family. Successful strategies for African American children include dancing to rap and hip-hop music, jumping rope (for girls), and participating in extracurricular competitive affordable sports and activities.	Useful by purely descriptive analysis of culturally competent strategies to deal with obesity in Black and Latino communities; provided no quantitative assessment of strategies or measures of effectiveness.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Peirson et al., 2015	Review evidence on the effectiveness of behavioral interventions for preventing overweight and obesity in children and adolescents.	Children, adolescents ages 0-18; duration 12 weeks or more	123 papers representing 90 studies	Review	Earliest publication date through August 2013	All studies conducted in mixed-weight populations; randomized trials of primary care-relevant behavioral (diet, exercise, lifestyle, or any combination of these) interventions that included data for BMI, BMI z-score, or prevalence of overweight/ obesity.	Interventions showed a small but significant effect on BMI and BMI z-scores (standardized mean difference -0.07 CI -0.10 to -0.03), reduction in BMI (mean difference -0.09 kg/ m2 CI -0.16 to -0.03) and a reduced prevalence of overweight and obesity. No intervention consistently produced benefits. For children who were already overweight or obese, the changes were not clinically meaningful but might be over time.	NR	Included studies involved mixed-weight populations, making it impossible to examine prevention specifically in normal-weight children; risk of bias unclear in most studies; statistical heterogeneity was high for BMI and BMI z-score outcomes; only features of interventions with a significant benefit were examined, therefore it is impossible to say whether their characteristics differed from interventions that failed to have a positive impact.
Branscum & Sharma, 2011	Analyze findings for health education and promotion interventions aimed at the prevention of childhood overweight and obesity among primarily Hispanic children.	Children	9 studies; N= 2,067	Review	2000- May 2010	RCTs, quasi-experimental studies, and pilot studies. Inclusion criteria included publication in English, primary research article evaluating an intervention strategy for treatment or prevention of childhood obesity, and the primary audience for intervention was Hispanic, Latino, or Mexican American. Reviews excluded.	Only 4 studies had significant findings, with effect sizes (Cohen's f) ranging from small to medium with the highest f = 0.26. Interventions more likely to be successful when participants were at a higher risk for obesity, a parental component was included, the intervention contained theoretical underpinnings, the intervention was delivered by a dedicated staff, the intervention served older children, and the intervention was longer in duration. Most studies used culturally appropriate intervention materials (e.g. ethnically relevant foods).	All studies ranged from 72-100% Hispanic participants.	Experimental rigor in the studies reviewed greatly varied; studies rarely employed follow-up evaluations; studies used few measures other than weight status; absolute BMI is not recommended for use in children and was used in two studies.
Bambra et al., 2015	Review the effectiveness of individual, community and societal interventions in reducing socioeconomic inequalities in obesity among children and adults in any setting or country and establish how such interventions are organized, implemented and delivered.	Children, adolescents, & adults; duration 12 weeks or more	76 studies (85 papers) related to children; 103 studies (103 papers) related to adults; any setting or country	Review	Child review includes studies through October 2011; adult review includes studies through October 2012	Experimental and observational studies; studies must include a primary outcome that is a proxy for body fat and must examine differential effects with regard to SES or specifically target disadvantaged groups or deprived areas; interventions involving drugs, surgery, or lab-based studies excluded; studies examining ethnic inequalities rather than SES excluded.	Interventions that aim to prevent, reduce, or manage obesity do not increase inequalities; some interventions reduce the social gradient in obesity or decrease obesity among more deprived groups. For children, targeted school-delivered interventions and environmental interventions had the most evidence of effectiveness.	All studies examine effectiveness in regards to SES level or area deprivation.	Few evaluations of societal-level interventions were located; studies were generally not of high quality; no studies assessed cost of interventions; the quality assessment tool seems to favor a more clinical model; the implementation tool allowed only a brief summary of implementation factors to be made; exclusion of studies examining ethnic inequalities may have reduced US-based literature in which ethnicity is often used as a proxy for SES.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
McGill et al., 2015	Evaluate interventions to promote healthy eating and identify whether impacts differ by socioeconomic position.	Children, adolescents, & adults	36 studies, international	Review	1980-2013	Healthier diets were defined as reduced intake of salt, sugar, trans-fat, saturated fat, total fat, or total calories or increased consumption of fruits, vegetables, and whole grain. Studies must include quantitative results presented by a measure of SEP.	Upstream interventions, categorized as "price" (taxes, subsidies) consistently appear most likely to decrease inequalities; downstream, "person" (dietary counseling) interventions seem most likely to increase inequalities; "place" interventions show mixed results but do not appear likely to widen inequalities.	All studies evaluated for effects on SEP inequalities.	Lack of studies quantifying the differential effectiveness of dietary interventions by SEP; studies restricted to English; in many studies significance levels were not presented therefore the magnitude of results was used to determine differential effects; many interventions were multi-component in nature and involved a subjective element when categorizing; age and sex differences were not examined in detail; majority of modelling studies had weak quality scores.
Beauchamp et al., 2014	Identify interventions for obesity prevention that evaluate a change in adiposity according to SEP and determine effectiveness of these interventions across different socioeconomic groups.	Children, adolescents, adults	14 studies, all from developed countries, including 9 conducted among children; N= 364,521 plus 70 families	Review	1997-September 2012	Studies that describe an obesity prevention intervention and report anthropometric outcomes according to a measure of SEP; studies aimed at entire population or community (not targeting lower SEP groups); any type of study design; English only.	Interventions shown to be effective in lower SEP participants included community-based strategies or policies aimed at structural changes to the environment; interventions based on information provision directed at individual behavior change were shown to be ineffective in lower SEP participants.	All studies compare intervention effects across SEP.	Potential for publication bias; English studies only; unclear whether interventions were sufficiently powered to stratify by SEP as no studies reported power analyses by subgroup; studies reporting percentiles may not take into account normal BMI variation with age.
Hillier-Brown et al., 2014	Review studies of the effectiveness of individual, community and societal interventions operating via targeted or universal approaches in reducing socioeconomic inequalities in obesity-related outcomes in children	Children age 0-18, followed for at least 12 weeks	23 studies; any setting or country; N= 17,513	Review	Earliest publication date through October 2012	Studies that included interventions aiming to prevent obesity, treat obesity, or improve obesity-related behaviors (diet and/or PA) were considered relevant as long as they provided analysis on both SES and obesity-related outcomes; included RCTs and non-randomized controlled trials (experimental studies).	Only limited evidence found of the effectiveness of interventions with the potential to reduce SES inequalities in obesity-related outcomes amongst children. However, findings suggest that these interventions do not increase SE inequalities and many have the potential to slow the widening of the obesity gap.	All studies examined differential effects with regard to SES or specifically targeted disadvantaged groups/ deprived areas.	Quality assessment tool seems to favor more clinical models; definitions of intervention level classified most studies as community-level interventions; studies examining ethnic inequalities were excluded and may have reduced US literature where ethnicity is often used as a proxy for SES.
Waters et al., 2011	Determine effectiveness of interventions intended to prevent obesity in children, assessed by change in BMI.	Children; meta-analysis performed with subgroup analysis by age (0-5, 6-12, 13-18 years); duration 12 weeks or more	55 studies; international	Review	1990 - March 2010	Controlled study design with or without randomization; studies evaluated interventions, policies, or programs; studies randomized at a cluster level required to include at least six clusters.	Children in intervention groups had an overall mean difference in adiposity of -0.15kg/m2, a small but important shift, especially if sustained over time. Beneficial effects of childhood obesity prevention programs proved particularly strong for children ages 6-12 years.	The review was unable to identify which aspects of the programs have in fact contributed to weight loss. Some studies examined likelihood of interventions to increase health inequalities and found that they did not appear to. No conclusions drawn as to what interventions may reduce SE-related differences in BMI.	Unexplained heterogeneity; likelihood of small study bias; not all studies were randomized which may have facilitated entry of children and/or families who were already motivated to lose weight.

STUDY/ CITATION	TOPIC	AGE RANGE OR M (SD)	SAMPLE	TYPE OF STUDY	YEARS COVERED	STUDY CRITERIA OR DESIGN	OUTCOME, CONSTRUCT MEASUREMENT, FINDING	FOCUS ON RACE OR SE DISPARITIES	LIMITATIONS
Wang et al., 2015	Evaluate effectiveness of childhood obesity prevention programs conducted in high-income countries and implemented in various settings.	Children ages 2 -18; minimum study duration 1 year or 6 months for school interventions	147 articles total (139 interventions) N= 183,683 plus 24 schools	Review	Earliest publication date through April 2013	RCTs, quasi-experimental studies, and natural experiments targeting diet and/or PA that reported intervention effects on adiposity-related outcomes; studies targeting only overweight or obese children excluded.	Meta-analysis found small improvements of about 0.05 BMI z-score and 0.25 BMI. Moderate evidence to support the effectiveness of school-based interventions (those implemented with home involvement had highest proportion of favorable results); a greater proportion of multi-setting studies demonstrated significant and beneficial results compared to single-setting interventions; improving access to PA facilities and healthful food choices is effective.	NR	Only studies from high-income countries included; great heterogeneity in the included studies; few studies found outside of the school setting; results stratified based on study setting and intervention strategy (diet and/or PA) but could not be stratified further due to limited sample sizes; limitations of using BMI as primary outcome of interest; studies assessed intervention effects in different ways and were challenging to compare or pool; some studies aimed to reduce CV risk rather than obesity.
Foltz et al., 2012	Summarize population-level intervention strategies and specific intervention examples that illustrate ways to help prevent and control child obesity though improved nutrition and PA behaviors.	Children	NR	Review	NR	Intervention strategies identified from systematic reviews, evidence- and expert- consensus-based recommendations, guidelines, or standards, and peer-reviewed synthesis reviews. Intervention examples identified from peer-reviewed literature as well as sources with research-tested and practice-based initiatives. Content experts for each setting summarized available intervention strategies and selected intervention examples for inclusion.	Best available evidence should be applied across various settings (ECE, school, community, health care, home) and levels (education, social support, policy, systems, and environmental change) to support nutrition and PA choices for obesity prevention.	Tailored interventions for high-risk populations may be included in population-level initiatives.	Majority of research evaluates interventions in the context of a single setting.
Whitt-Glover et al., 2009	Identify characteristics of effective interventions to increase physical activity and physical fitness in African Americans.	Children, adolescents, adults; study duration 2 weeks – 8 months	29 studies in adults, 14 studies in children; N= 10 – 1,000+	Review	1985-2006	Most studies were RCTs; all but six specifically targeted African Americans. Inclusion criteria included intervention studies that sought to increase PA, energy expenditure, or improve physical fitness levels through lifestyle changes, formal exercise, or training programs, or increased recreational/leisure-time PA, regardless of whether PA was the main study outcome. Studies included men, women, children, or communities with 85% or more African Americans or reported PA outcomes separately for African Americans.	Most studies in children did not show significant between-group differences. Studies with explicit cultural adaptations did not necessarily result in better PA outcomes.	All studies included 85% or more African Americans or specified their PA outcomes separately.	Most studies specifically targeted African Americans making comparisons of effectiveness in African Americans versus the general population impossible; methodological heterogeneity limited comparisons of findings across studies; many studies that may have been relevant did not report separate data for African Americans; most studies did not include long-term post intervention follow-up.