

**PROGRAMS DESIGNED TO REDUCE
OBESITY AND CHRONIC DISEASE AMONG CHILDREN
BY INCREASING ACCESS TO NUTRITION
AND PHYSICAL ACTIVITY
A Review of the Literature**

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Introduction

The Skagit County Healthy Communities Project (SCHCP) aims to decrease chronic disease and obesity by increasing access to nutrition and physical activity. The SCHCP Advisory Leadership Team held three summits inviting educators, healthcare professionals, and community members to brainstorm a list of strategies and priorities for addressing the issue of chronic disease and obesity among children. A literature review was performed to help inform the “next steps” in addressing these issues. The literature review was a systematic exploration of the topics suggested by the summit participants. Under each heading, a search was conducted to determine if existing programs/strategies have been developed in other communities and have been found to be successful.

Correlations/Associations

Studies such as the one conducted by Matthew Davis, M.D.ⁱ have documented correlations between overweight and obesity and other factors. For example, children who are in families who eat together are more likely to eat nutritious meals, and have a lower incidence of obesity. Associations such as these have led to recommendations for improving the health of our children. However, it is much more challenging to establish a direct cause and effect relationship, that is, factors which if manipulated result in less overweight and obesity. Referencing the example above, until there is evidence to support such a claim, it is not yet known if getting families to eat together will lead to more nutritious meals. Other factors may explain the association; it may also be true that changing one factor may not be enough to achieve the desired outcome.

Achievement of intermediate goals

A smaller, but substantial number of studies have been able to document the achievement of intermediate goals. For example, a nutrition education program may be deemed effective because children are able to correctly identify how many fruits and vegetables they should consume in one day. However, the knowledge may or may not translate into a change in behavior. Taking this a step further, even if an outcome study is able to document that a nutrition education program positively impacts the nutritional intake of the children in the program, it still may not lead to a reduction in overweight and obesity.

Achievement of end goals

The literature is limited when the measure of success is a decrease in obesity or overweight. Even fewer programs have demonstrated that the effects are maintained over time.

A relationship between obesity, poor nutrition, inactivity and increased risk of chronic disease in adults is documented in the literatureⁱⁱ. An emerging body of evidence is beginning to show an increase of risk factors sooner in life. However, none of the studies cited in this review were of sufficient magnitude to include chronic disease as an outcome measure.

There was no magic bullet discovered in the literature review. Addressing any single variable has had minimal success in overcoming this complex problem. The programs that show the most promise appear to be those that incorporate multiple approaches including both physical activity and nutrition. Therefore, as community members consider which strategies to pursue, they are advised to be aware of what they can and cannot expect from their efforts. They should also be encouraged that they may be one piece of a bigger solution in the effort to decrease chronic disease and obesity.

Literature Review

Increase Physical Activity at School

One of the strategies suggested at the summits was to increase physical activity in schools. Specific suggestions included increasing involvement on sports teams, involvement in intramural activities, walking/biking to school, recess time, and resources for PE and playground equipment. Others suggested changing the PE curriculum in schools, prohibiting taking away recess as a punishment, promoting non-sport physical activities, and promoting physical activity breaks. The association between decreased physical activity and higher BMI scores is not in question; it is a well-established correlationⁱⁱⁱ. This review seeks to scrutinize the effects of each strategy to see if a cause and effect relationship can be measured. It is important to note that outcome studies vary based on the measurement scale used. For example, studies that aim to show less overweight using BMI as a measurement may not take other major factors in to account. Even if BMI scores did not improve, children may experience benefits of increasing their physical activity that were not observable from BMI scores. It is important to note in each study which measurement tool was used and whether or not it was the appropriate tool considering the objective.

The British Columbia Children's Hospital's Department of Pediatrics performed a meta-analysis of 18 studies involving 18,141 elementary school children^{iv}. The analysis intended to determine whether or not BMI could improve with physical activity interventions. The study states, "Variation in the duration, intensity and structure of school-based physical activity interventions had minimal effects on short-term or long-term BMI change. The consistency of the BMI results among the studies included in the meta-analysis was striking ($r = 0.97$). This finding is important for policy-makers who continue to promote school-based physical activity as a central component of the strategy to reduce childhood obesity." Those who conducted the study clarify that there is not a clear reason for the intervention's failure to achieve more positive BMI scores. They speculate that the amount of increased physical activity may have been insufficient to improve BMI, either because of the quantity of physical activity in the intervention or because of children's individual adherence to the programs. A second possibility is that there may have been a positive change in BMI among a small group of children, but the "effect was attenuated in the assessment of the entire population. For example, it is plausible that children with higher baseline BMI would benefit more from such interventions. Conversely, children with higher BMI may have lower levels of adherence. As a consequence, they would benefit less from such interventions." Considering the association between reduced physical activity and obesity, these findings are perplexing. The meta-analysis suggests that other variables may have a more substantial causal link to obesity, namely nutrition. However, physical activity, regardless of its effect on BMI, may have other health benefits, including decreasing chronic disease.

Instead of isolating physical activity as it relates to BMI, a study published in *Medicine & Science in Sports & Exercise* took a look at exercise as a supplement to diet^v. The study compared diet programs with diet plus exercise programs. Findings indicated that individuals who were prescribed a regimen of exercise alone or exercise combined with diet experienced a greater fitness change than subjects provided diet alone or no exercise at all. The study noted that there was not sufficient evidence to make a quantitative analysis of exercise alone programs. However, even without the exercise alone component, these findings indicate that exercise may effect a positive change among overweight and obese children who are following a diet program.

Another study, published in the *Journal of Consulting and Clinical Psychology*, supports the idea that exercise enhances the benefits of proper nutrition. The study randomly assigned obese children and parents to three different groups: diet, diet plus exercise, and no-treatment control^{vi}. The abstract summarizes, “At 6 months, parents and children in both treatment groups had equal and significantly better weight change than members of the control group. At one year, however, parents given diet plus exercise showed better weight losses than parents given diet alone.” Furthermore, “Discriminate analyses showed that initial relative weight was the best predictor of 12-month relative weight for both parents and children but that exposure to the exercise program during treatment was a predictor of maintenance of nonobesity.” This study suggests that while diet can effect a positive weight change in children and adults, exercise and diet together are more likely to effect a greater change and are better predictors of maintenance of healthy weight.

The Centers for Disease Control and Prevention (CDC) published a report titled, “Recommended Community Strategies and Measurements to Prevent Obesity in the United States^{vii}” within its *Morbidity and Mortality Weekly Report* (MMWR). Among these recommendations was increasing the amount of physical activity in school-based PE classes, which was found to be an effective way to increase physical activity among children (a median effect of 8% increase in aerobic fitness among school-aged children). Studies were conducted of 2 programs which aim to increase time spent being active and playing physically engaging games during PE: SPARK and CATCH. The report states, “A quasi-experimental study of the Sports, Play, and Active Recreation for Kids (SPARK) school PE program, which is designed to maximize participation in physical activity during PE classes, demonstrated that the program increased physical activity during PE classes but the effect did not carry over outside of school. The study identified no significant effects on fitness levels among boys ($p = .29-.55$), but girls in the classes led by a PE specialist were superior in abdominal and cardio respiratory endurance to girls in the control condition ($p = 0.03$). The Child and Adolescent Trial for Cardiovascular Health (CATCH—now called “Coordinated Approach to Child Health”) is another intervention, which aims to increase Moderate to Vigorous Physical Activity (MVPA) in children during PE classes. A randomized, controlled field trial of CATCH that was conducted with more than 5,000 third-grade students from 96 public schools over a 3-year period indicated that the intensity of physical activity in PE classes (class time devoted to MVPA) during the intervention increased significantly in the intervention schools compared with the control schools ($p < 0.02$). The background and training of teachers who deliver PE curricula might mediate the effect of interventions on physical activity. For example, one study indicated that SPARK classes led by PE specialists spent more time per week in physical activity (40 minutes) than classes led by regular teachers who had received training in the curriculum (33 minutes).”

After school interventions have provided yet another setting in which children can meet the physical activity recommendations. The same CDC report^{viii} summarizes a study done of the Promoting Life Activity in Youth program, or PLAY. PLAY “is designed to teach active lifestyle habits to children and help them to accumulate 30-60 minutes of moderate to vigorous physical activity per day. One study indicated that participation in PLAY and PE had a significant impact on physical activity among girls ($p < 0.001$) but not for boys. Lack of access is a barrier that might limit the impact of increased availability of opportunities for extracurricular physical activity. In East Palo Alto, California, where the city provided buses from schools to the community center, 70% of the eligible girls attended dance classes at least 2 days a week. In

Oakland, where the city did not provide buses, only 33% of eligible girls attended the class two or more times a week.”

In summary, while children receive several benefits from exercise, it is possible that physical activity alone may not be enough to impact BMI. Findings suggest that exercise adds to the effect of diet, making it a valuable tool in addressing childhood obesity. In-school nutrition plus exercise programs have shown some promise toward the goal of effecting positive change.

Increase Nutrition at School

Another strategy suggested by summit participants was to improve nutrition within schools. Ideas included promoting healthy lunch menus, promoting vegetarian lunch options, deemphasizing food, encouraging healthier food options at sporting events, promoting healthier vending machine options, introducing nutrition education into schools, and creating a partnership between schools and local farmers. While the meta-analysis performed by the BC Children’s Hospital showed that school-based physical activity interventions did not improve BMI, it found that interventions that include a nutrition component show more promise for improving BMI^{ix}.

Research shows that eating behaviors are strongly influenced by foods available in children’s immediate environment, i.e., home and school. For this reason, food served within the school setting is worthy of close scrutiny. The National School Lunch Program, established upon the passage of the 1946 National School Lunch Act, is a tool used today to address dietary concerns of American children in public schools. National School Nutrition Dietary Assessment (SNDA) studies^x, which are supported by the USDA, provide national benchmarks for determining how well schools are meeting nutrition related standards as well as a snapshot of the food and nutrient content of current school meals. This information helps determine trends over time. The third SNDA study analyzed public schools that participated in the National School Lunch Program (NSLP) in the 48 contiguous states and Washington DC. This study found that 83% of public/private schools combined participate in the NSLP. Within those schools, 60% of all children participate in the program each day, 49% of which were provided for free to students in the low-income bracket. The study found that more than 85% of schools met the School Meals Initiative (SMI) for Healthy Children standards, which is the USDA’s current regulatory standard. However, 6% of schools met all of the SMI standards, and very few of the schools served lunches that met the sodium and fat standards. Vegetables and fruits were in short supply in the lunchroom.

The study’s summary states, “Results of SNDA-III show that many schools have improved the nutritional quality of the NSLP and SBP school meals and foods sold outside of the reimbursable meal programs (competitive foods). However, there is much more room for improvement. Schools need to do even more to reduce the availability of high-calorie, low-nutrient foods and make school meals more nutritious. Although the majority of US schools offer breakfasts and lunches that meet the standards for key nutrients (such as protein, vitamins A and C, calcium, and iron), reimbursable school meals remain too high in saturated fat and sodium, and children are not consuming enough fruits, vegetables, and whole grains. Many public schools are constrained in providing better meals because of limited funds. It is time to reexamine the formulas used to set national reimbursement rates with reference to the costs of producing and serving school meals that meet the Dietary Guidelines.”

There is substantial evidence suggesting that one of the major obstacles to providing nutritious options for children is the accessibility of low-nutrient, energy-dense foods, which are available as “extras” in the lunchroom (not included in NSLP). These foods are generally found

in vending machines and as a-la-carte options in the cafeteria, and are also referred to as “competitive foods.” A study published in the *Journal of the American Dietetic Association (Supplement)* aimed to determine the relationship between school food environment and practices and the weight status of public school children^{xi}. Body Mass Index was used to measure weight status. The study found that, “Among elementary school children, offering French fries and similar potato products in subsidized school meals more than once per week and offering dessert more than once per week were each associated with a significantly higher likelihood of obesity. Among middle school children, the availability of low-nutrient, energy-dense foods in vending machines in or near the foodservice area was associated with a higher BMI z score, and the availability of such foods for à la carte purchase in the cafeteria was associated with a lower BMI z score.” The study’s findings suggest that further research is warranted to determine if children’s BMI scores improve if access to low-nutrient, energy-dense foods is reduced^{xii}.

Research shows that sugar-sweetened beverages have a negative impact on overall health, including a less healthy diet, dental decay, and anxiety (among other things). This consumption has increased over the past thirty years, according to a study conducted through *Healthy Eating Research*, a program of the Robert Wood Johnson Foundation^{xiii}. The study noted that 13% of adolescent’s daily caloric intake (in 2004) was from sugar sweetened beverages, which is associated with caloric excess and weight gain. However, schools struggle to strike a balance between limiting consumption of sugar-sweetened beverages and profiting from them. For example, cola corporations have, in exchange for the right to place vending machines in schools, guaranteed profits for the schools in which their machines are placed^{xiv}. Also, certain cola brands offer to donate equipment to schools, provided that their logo is a prominent feature of the equipment (score boards, for example). Obviously the benefits of providing options such as soft drinks are something that schools consider. The bottom line is that sugar sweetened beverages are correlated with greater caloric intake which correspondingly is correlated with obesity. Efforts to reduce consumption of sugar-sweetened beverages within schools have the potential to make a great impact in daily caloric intake.

Efforts to promote nutrition and exercise in the school setting have led to several evidence-based interventions. One such intervention is the Coordinated Approach to Child Health, or CATCH program mentioned earlier in this report. The CATCH program focuses on both increasing physical activity and improving healthy eating. The CATCH program involves classroom and physical education teachers, school food service personnel, and families of students. From 1991 through 1994, a controlled trial study was conducted to evaluate this program^{xv}. According to the study, “As a result of the CATCH program, students in the intervention schools significantly increased time spent in moderate to vigorous physical activity within physical education classes (from 40% to 50%) and considerably decreased their consumption of fat in school meals (from 39% to 32%). A 3-year follow-up study between 1995 and 1998 assessed diet, physical activity, and related health indicators among 3714 (73%) of the initial CATCH participants. Students receiving the CATCH intervention in grades three through five maintained a diet considerably lower in total fat and saturated fat and participated in more vigorous physical activities in grades six through eight than did students in control groups. These findings reinforced the expectation that participation in the CATCH program could contribute to better cardiovascular health as students mature.”

The CATCH program has also demonstrated promise in a Hispanic community in El Paso, Texas. “Participation in the CATCH program stemmed the rate of increase in overweight

among both girls and boys in grades three through five. Without the CATCH intervention, overweight increased among students in these grades from 26% to 39% among girls and from 40% to 49% among boys (9). These figures can be compared with 30% to 32% for girls and 40% to 41% for boys who participated in CATCH. Thus, participation in the CATCH program appears to help address the obesity epidemic affecting children today, and researchers using the results of the El Paso study found CATCH to be cost-effective (S. Brown, oral communication, June 2005).”

The CATCH program has proven to better cardiovascular health as well as limit overweight among some of its participants. CATCH also provides an after-school curriculum with similar components. The program evaluation detailed above is specific to the in-school program. To date, there are not significant effectiveness studies of the CATCH after-school program. However, based on in-school outcomes, it is a promising strategy.

Li Yan Wang conducted a study of another after-school program, titled the FitKid Project, which also included both physical activity and nutrition components^{xvi}. The researcher was able to document a small, but significant decrease in percentage of body fat (-.76%) when compared to a control group (0.1%). However, these positive findings were discernable only among children who participated in at least 40% of the sessions.

Some nutrition programs have focused specifically on increasing consumption of fruits and vegetables. A report by the Centers for Disease Control and Prevention^{xvii} states, “CDC's Community Guide reports insufficient evidence to determine the effectiveness of multicomponent school-based nutrition initiatives designed to increase fruit and vegetable intake and decrease fat and saturated fat intake among school-aged children. However, systematic research reviews have reported an association between the availability of fruits and vegetables and increased consumption. Farm-to-school salad bar programs, which deliver produce from local farms to schools, have been shown to increase fruit and vegetable consumption among students. A 2-year randomized control trial of a school-based environmental intervention that increased the availability of lower-fat foods in cafeteria à la carte areas indicated that sales of lower-fat foods increased among adolescents attending schools exposed to the intervention.” This affirms the concept that availability of lower calorie competitive food options as opposed to dense, high-fat, high-calorie options can effect a very positive change in eating behaviors among school-age children, which, in turn, is associated with lower BMI scores^{xviii}.

In 2002, the United States Department of Agriculture (USDA) funded a fruit and vegetable pilot in four states and one Indian Tribal Organization^{xix}. The purpose of the pilot was to increase the consumption of fruits and vegetables in schools. The CDC reports that because of its popularity, the USDA Fruit and Vegetable Grant program is now operational in all 50 states. While outcome measures for this program are not available, in light of the studies cited above, this is a promising strategy.

A study published in *Pediatrics* examines the effects of a multicomponent, School Nutrition Policy Initiative on the prevention of overweight and obesity^{xx}. The study followed 1349 fourth through sixth graders, 50% of whom were eligible for free or reduced-price meals at school, for two years. The Initiative included self-assessment, nutrition education, nutrition policy, social marketing, and parent outreach components. It incorporated “a de-emphasis on food as a reward/punishment/celebration and increasing the number and frequency of children eating breakfast at school.” The success of the program was measured by a comparison of incidences of overweight and obesity from pre and posttests for students in the test group and control group. Secondary outcomes were “prevalence and remission of overweight and obesity,

BMI z score, total energy and fat intake, fruit and vegetable consumption, body dissatisfaction, and hours of activity and inactivity were secondary outcomes.” The abstract summarizes, “The intervention resulted in a 50% reduction in the incidence of overweight. Significantly fewer children in the intervention schools (7.5%) than in the control schools (14.9%) became overweight after 2 years. The prevalence of overweight was lower in the intervention schools. No differences were observed in the incidence or prevalence of obesity or in the remission of overweight or obesity at 2 years.” This suggests that a school-based nutrition program can have a positive affect in preventing incidence of overweight among school-age children, particularly with a high percentage of kids who qualify for free or reduced lunches.

In summary, several programs have been successful in increasing the consumption of fruits and vegetables. This includes those efforts to make fruits and vegetables more available or affordable. Some studies of in-school programs that include both a physical activity and nutrition component have documented improvement in nutrition and levels of physical activity for the participants. At least one after school program, also incorporating both physical activity and nutrition documented improvement in body fat percentage when the students participated in at least 40% of the sessions.

Promote Access to Low or No-Cost Healthy Food in the Community

In order to promote access to low or no-cost healthy food in the community, summit participants suggested access to community gardens, food stamps, feeding programs, farmer’s markets, and food banks that receive fresh produce directly from farms. Others suggested the use of pre-established programs such as WIC and Farm to Food Bank programs. Cost can be a significant barrier to consuming healthy food, as fresh fruits and vegetables are generally not the cheapest options. Strategies that improve affordability of healthier food could conceivably cause more parents to spend money on foods with lower sugar, sodium, and fat content.

Perception of cost may be exacerbated by lack of knowledge. Dr. Drewnowski makes the point that it is possible to select more nutritious options on a budget^{xxi}. However, this may require education on nutrition and comparative shopping.

The Centers for Disease Control and Prevention developed a study to ascertain whether or not reduction of cost on healthier foods would increase the purchase of said food^{xxii}. The report details, “One study indicated that sales of fruits and carrots in high-school cafeterias increased after prices were reduced. In addition, interventions that reduced the price of healthier, low-fat snacks in vending machines in school and work settings have been demonstrated to increase purchasing of healthier snacks. A recent study estimated that a subsidized 10% price reduction on fruits and vegetables would encourage low-income persons to increase their daily consumption of fruits from 0.96 cup to 0.98--1.01 cups and increase their daily consumption of vegetables from 1.43 cups to 1.46--1.50 cups, compared with the recommended 1.80 cups of fruits and 2.60 cups of vegetables.”

The report continues, “Interventions that provide coupons redeemable for healthier foods and bonuses tied to the purchase of healthier foods increase purchase and consumption of healthier foods in diverse populations, including university students, recipients of services from the Supplemental Nutrition Program for Women, Infants, and Children (WIC), and low-income seniors. For example, one community-based intervention indicated that WIC recipients who received weekly \$10 vouchers for fresh produce increased their consumption of fruits and vegetables compared with a control group and sustained the increase 6 months after the intervention.”

The same report developed by the CDC detailed the importance of access to supermarkets and full service grocery stores. Supermarkets tend to have a greater selection of healthy foods at lower-costs than smaller stores in low-income, minority, and rural communities. A study published in the *American Journal of Preventative Medicine*^{xxiii} found a positive association between nearby supermarkets and healthy eating behaviors.

Education and “How To” Materials

Participants suggested the development and dissemination of educational and “how to” materials as a strategy for influencing children and their parents. Suggestions included information on the benefits of exercise as well as materials that stress health over appearance. Among the “how to” suggestions were “how to cook healthy meals,” “how to shop for healthy foods,” “how to order healthy food at restaurants,” “how to pack healthy lunches,” and “how to ride a bike.”

Health related pamphlets have been found to be effective in changing knowledge and beliefs, and sometimes behaviors^{xxiv}. The measure of their effectiveness is related to the method of dissemination and whether the pamphlets are coupled with other interventions. A study conducted to determine the cost-effectiveness of Health Education Materials included a summary of a literature review of publications between 1985 and 1992 that sought to determine the effectiveness of Health Education Materials^{xxv}. The study succinctly summarized the work of the literature review as such, “The review found that the effectiveness of pamphlets varied according to three aspects of how pamphlets were used:

1. Pamphlets were more likely to be effective when used for patient education than public education.
2. Effects on behavior varied according to whether a pamphlet was used alone or as an addition to another form of intervention.
3. Pamphlets appeared more consistent in changing knowledge and attitudes than behavior.”

The third point is key. The objective of this project is to reduce and prevent childhood obesity by changing behavior. One could certainly argue that knowledge and attitudes influence behavior, but changing behavior itself is a much more direct way of affecting a change in childhood obesity. While pamphlets have been found to be a good supplement to other efforts toward the end of preventing childhood obesity, this study suggests that it should be a support strategy. Also, pamphlets are more likely to be effective as patient education. As such, a doctor’s office is probably the most appropriate forum for distribution.

Increase Participation by Health Care Providers

Participants suggested involving health care providers in the fight against childhood obesity. Some thought health care providers could develop or provide educational materials, discourage waivers from physical activities at school, and develop a system of referrals for physical activity and nutrition resources. Others suggested providing training to health care providers on how to discuss healthy lifestyles with patients during well-child check-ups.

The Robert Wood Johnson Foundation posted a summary of a study published in the *British Medical Journal*^{xxvi}, which found that “counseling from a primary care physician (PCP) does not aid in weight loss among overweight children or improve their physical activity levels.” The study surveyed approximately 4000 Australian children from ages 5 to 9. The article states, “The researchers then selected 258 overweight and obese children to either receive routine care or participate in a 12-week intervention consisting of four consultations

with PCPs at which they and their families established goals for changing eating habits, increasing physical activity, reducing sedentary behaviors and increasing water consumption. However, at six-month and one-year follow-up visits there were no significant differences between the two sets of children in terms of body mass index, waist circumference, overall nutrition, physical activity, and quantities of fruits, vegetables, fat and water consumed. Although the researchers concede that there were no detrimental effects associated with participation in the intervention group, they noted that the program's cost, which averaged \$1,100 per child, was far higher than that of traditional care, which averaged \$64 per child. The researchers concluded that "these findings cast doubt on many countries' current policies that support universal surveillance coupled with brief, individualized secondary prevention by the primary sector to reduce childhood obesity." They suggest instead that resources for reducing childhood overweight and obesity be divided between improved community- and population-level prevention efforts and enhanced clinical treatment options for children diagnosed with obesity (Neale, *MedPage Today*, 9/4/09; Wake et al., *British Medical Journal*, 9/3/09)."

While this study concludes that counseling done by a primary care physician is not a sufficient intervention to address the needs of obese/overweight children, it is certainly not a message to discourage physicians from being active participants in an overall strategy to decrease childhood obesity. This simply suggests that primary care physicians should not be the primary or exclusive intervention provided to overweight and obese children. It is also possible that their intervention would have a greater effect when addressing chronic disease.

Built Environment

Finally, participants suggested intentional development of physical spaces that encourage physical activity, or "built environment." Suggestions included ensuring safe routes to school, ensuring walk able streets, building sidewalks, building play spaces in apartment complexes, establishing open spaces in public places, and creating recreation facilities.

To begin, the social environment in which a child lives must be conducive to physical activity. Neighborhood safety has been found to correlate with physical activity. A report summarized on the Robert Wood Johnson Foundation's online "Childhood Obesity Newsroom" speaks the effect that safety has on overweight^{xxvii}. It states, "Students who reported rarely or never feeling safe were 1.2 times more likely to be overweight or at risk of being overweight than their peers who reported always or frequently feeling safe. Among those who reported feeling unsafe, 68 percent indicated that gang violence was a serious problem in their neighborhood, with nearly 18 percent reporting that they had witnessed an assault in the past year. By comparison, only 11 percent of students who reported that they always felt safe indicated that gang violence was an issue in their neighborhood. Based on these findings, the study's authors call for the development of policies and programs to address gang activity and violence as a means to potentially curb obesity among adolescents living in urban environments (Hendry, Reuters, 8/24/09)." The issue of gangs is of particular interest in Skagit County. In Mount Vernon, 12.2% of 12th grade students who responded to a survey reported that they had been in a gang in the last year. This is in contrast to 7.2% statewide^{xxviii}.

A study published by the *American Journal of Public Health* investigated the influence of physical and social neighborhood environments on the physical activity and obesity of group of 650 5th Graders and their primary caregivers^{xxix}. The study was conducted via systematic neighborhood observation and survey data analysis. The study found that "a favorable social

environment was positively associated with several measures of physical activity and that physical activity was negatively associated with obesity in these children.” These findings suggest that health policy and efforts to reduce childhood obesity should consider neighborhood social factors and physical environment.

A study published in the *American Journal of Preventive Medicine*^{xxx} aimed to determine whether or not improvements in parks would increase park use and physical activity of park users. Results showed that after improvements were made to parks in the intervention group (for example, some built gyms, some enhanced the area around their playgrounds and climbing apparatuses, some made upgrades to walking paths), the overall number of people observed using the parks declined significantly at follow-up. Improvements in the parks did not result in increased park use and physical activity of park users. The study explains, “An average of 2000 people were observed using a park per week at baseline, but at follow-up only 1500 were seen with the decline in all age groups, except teens. Only three parks showed increased use at follow-up, with one being a control park where the director had scheduled additional baseball games that drew extra people.” However, it is important to note that the data analysis showed that declines in park use were consistent between intervention and control parks. Among park users in the intervention parks, respondents did perceive the park as safer than before the changes. The study suggests that an increase in park safety itself is not enough to increase park use. Looking at the variables in the study, programming and outreach are more likely to have an impact on park use.

Studies have been conducted to test the hypothesis that if more unhealthy options are available to children in their community, children are more likely to choose an unhealthy option. A study published in the *American Journal of Public Health* examined the relationship between fast-food restaurants in close proximity to schools and obesity among middle and high school students, using geocoded data on over 500,000 middle and high school students in California^{xxxi}. The study found that students with fast food restaurants within a half-mile of their schools consumed fewer fruits and vegetables, consumed more servings of soda, and were more likely to be overweight than those who did not have fast food restaurants available in the same proximity. The study concluded that “exposure to poor-quality food environments has important effects on adolescent eating patterns and overweight. Policy interventions limiting the proximity of fast-food restaurants to schools could help reduce adolescent obesity.”

Moreover, the CDC’s Recommended Community Strategies report suggests enhancing infrastructure to support bicycling lanes and opportunities for children to walk^{xxxii}. The report notes that improving opportunities to bike and walk is associated with increased frequency in bicycling and walking (physical activity). The report further detailed that the built environment has as much to do with the location of a school as it has to do with the quality built environment (i.e. enhanced infrastructure to support walking and bicycling). The majority of efforts have been made to increase the quality of routes to school, but the study indicates that perhaps another strategy should be to make efforts to build new schools within a close proximity to neighborhoods and residential areas. According to this CDC report, at least one study found that the combination of quality built environment and school location led to a 13% increase in nonmotorized travel to school. Motorized travel to school resulted in up to 2-3 pounds of annual weight gain if no other changes took place in energy intake of the observed youth. However, it is true that even schools within residential areas have seen a decrease in trends of children walking to and from school. Placing a school in a residential area and creating safe routes to school are both positive strategies as they address different barriers to walking and biking to school.

Summit participants suggested seeking community participation in this endeavor, including existing community groups (YMCA, Boys and Girls Clubs, Scouts, etc.) and/or developing new community based exercise programs for normal weight and obese or overweight children. Participants thought that community sponsored activities, such as family nights at the YMCA, Kids Run Free, or Healthy Kids Day, would promote healthy exercise and nutrition habits. These existing community groups can be considered as options for implementing any of the suggested programs or built environment concepts.

Summary

In summary, many factors have been associated with the incidence of overweight and obesity. The outcome literature suggests that the problem is complex and calls for a complex, or multi-faceted solution including both physical activity and nutrition components. It suggests that every sphere of influence should examine how it can contribute to the solution and maximize the positive changes within their control.

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