Examining Social Cognitive Theory and the Social Ecological Model in Reversing Predictors (Family Meals, Sleep, Media Use) of Childhood Weight Status Within the Home Environment

Ahondju Umadjela Holmes[1]
Mandy Golman[2]
Kristin Wiginton[3]
Ann O. Amuta[4]

Abstract
Although programs that focus on preventing and managing childhood overweight/obese status have been in place for some time and continue to be implemented, the prevalence of children who are overweight and obese keeps increasing. Research on protective and risk factors of childhood overweight/obese status continues to demonstrate the positive influence of family-based interventions on parents/caregivers and children. Such interventions represent some of the most viable strategies in managing childhood weight status. With a focus on predictors (family meals, sleep, and media use) within the home environment, this article reviews the applications of Social Cognitive Theory (SCT) and Social Ecological Model (SEM/EM) frameworks in preventing or reversing childhood overweight/obese status. Though these models have extensively been used in preventing or treating childhood overweight/obese status, differences in methodologies, design, sample sizes, measurement of outcomes, and duration of interventions limit generalization of findings.

Introduction

Epidemic prevalence of childhood overweight and obese status along with their immediate and long-term health consequences remains and continues to increase as documented by numerous research studies (Camp et al., 2017; Schuler & O'Reilly, 2017). SCT and SEM/EM are two frameworks that have extensively been used in preventing and treating childhood overweight/obese status. This article focuses on the use of SCT and SEM/EM within the home environment and reviews not only their effectiveness, but also reviews some of the

[1] Corresponding author. College of Health Sciences. aumadjela@twu.edu
[2] College of Health Sciences. mgolman@twu.edu
[3] College of Health Sciences. kiwiginton@twu.edu
[4] College of Health Sciences. aamuta@twu.edu

challenges that researchers have identified while using the theories of behavior change. This article is part of a previously published dissertation on *Exploring Family Meals, Sleep, and Media Use as Predictors of Childhood Overweight and Obese Status in Oklahoma: A Study from the 2016 National Survey of Children's Health* (Umadjela Holmes, et al. 2020).

Information Source and Search Strategy

A search was conducted for articles published from 2014 to 2019, on the PubMed, CINAHL, SocINDEX, PsycINFO, Child Development and Adolescent Studies, Family and Society Studies Worldwide, and Academic Search Complete electronic databases. Reference lists of articles were also scanned to identify additional articles. Additional and newer articles were hand searched, using the Scopus electronic database. The basic key terms used to search for articles, in combination with the Boolean logic terms "AND" and "OR", included social cognitive theory, social ecological model, ecological model, childhood obesity, overweight, prevention and control, risk factors, family, family meals, screen media use, digital media use, and sleep. The search was restricted to articles published in the English language that included participants between the ages of 6 and 18. Of 124 identified studies, 41 met the eligibility criteria. English language articles were included if they had (i) study participants between 6 and 18 years of age; (ii) a focus on preventing or treating childhood overweight or obese status without pharmacological strategies, and (iii) a focus on selected theories of behavior change (Social Cognitive Theory or Social Ecological Model).

Family Meals

Family meals influence current and future dietary behaviors in children. For instance, children tend to continue practicing eating behaviors acquired during childhood into adulthood (Caldwell, Terhorst, Skidmore, & Bendixen, 2018; Frederick, Snellman, & Putnam, 2014). Excessive consumption of high caloric foods is one of the key factors for weight gain; hence, children who are exposed to nutritious meals are more likely to consider such meals as part of their normal eating patterns and to carry their food preferences into adulthood (Caldwell et al., 2018; Rogers et al., 2017). In fact, children's consistent observation of their parents/caregivers' eating patterns leads to an increase or a decrease in the acceptance of foods that parents/caregivers eat or do not eat (Caldwell et al., 2018; Rogers et al., 2017). This complex process, known as the social modeling of eating, occurs when observation of other people's food choices and intake guides another person's choices (Cruwys, Bevelander, & Hermans, 2015; McGeown & Davis, 2017). Research demonstrates that having one or two family meals per week provides a protective effect during adolescence and adulthood as a result of behaviors acquired at a younger age (Berge et al., 2019; Jones, 2018). In fact, families that have frequent meals with their young children help establish behaviors that tend to continue even during adolescence (Berge et al., 2015; Loth et al., 2018).

Sleep

Shorter sleep is associated with many negative health outcomes, one of which is childhood obesity (Gohil & Hannon, 2018; Ogilvie & Patel, 2017). The presence and use of electronic entertainment and communication devices such as televisions, computers, tablets, video games, and cellphones during the hour before sleep, early school start times, academic workload, and caffeine consumption negatively affect the duration and quality of sleep in children (Dube, Khan, Loehr, Chu, & Veugelers, 2017; Gohil & Hannon, 2018). Researchers

suggest that the use of media within an hour of sleep, stress related to school, and caffeine use tend to reduce the duration and quality of sleep in children (Dube, Khan, Loehr, Chu, & Veugelers, 2017; Gohil & Hannon, 2018; Reid Chassiakos, Radesky, Christakis, Moreno, & Cross, 2016).

Lack of sleep or insufficient sleep has been shown to increase both adult and childhood obesity risk due to changes in hormones that regulate hunger (ghrelin) and satiety (leptin) (Hart et al., 2017; Ogilvie & Patel, 2017). Since parents and caregivers play critical roles in modeling healthy lifestyles, interventions that support efforts to change the environment by restricting exposure to or usage of electronic devices, through enhancing parent-child interactions, can positively affect the amount and quality of sleep (Reid Chassiakos et al., 2016).

Media Use

Increased use of screen media by children has been associated with a higher incidence of childhood obesity, depression, the risk of developing hypertension, insulin resistance, high cholesterol, high inflammation, metabolic syndrome, and a risk for adult obesity (Lee, Kubik, & Fulkerson, 2018; Robinson et al., 2017). While this might be alarming, studies also reveal that interventions that seek to reduce the time spent using screen media positively affect behaviors and weight outcomes in children (Reid Chassiaskos et al., 2016).

The mechanisms that explain the association between increased media use and weight gain include reduced time for physical activities, increased intake of energy-dense foods/beverages during media exposure, reduced intake of fruits and vegetables, and reduced sleep (Tanskey et al., 2018). In addition to that, exposure to food advertisement increases the consumption of food and beverages (Lee et al., 2018; Robinson et al., 2017). Satiety cues become obscured as children become distracted while watching screen media (Lee et al., 2018; Robinson et al., 2017).

Social Cognitive Theory

Initially referred to as social learning theory (SLT) to explain the process of learning as a function imitation (Edberg, 2020; Sharma, 2017), SCT focuses on the impact of a person's attributes, behaviors, and the environment on health behavior change (Bandura, 1986; Rimer & Glanz, 2005). In SCT, behavior change occurs as a function of individual or internal characteristics and environmental or external factors, which summarize the key constructs of SCT (Edberg, 2020). Key constructs of the SCT that represent individual/internal characteristics include self-efficacy, behavioral capability, outcome expectations, outcome expectancies, self-control, and emotional coping (Bandura, 1986; Edberg, 2020). Those that represent environmental factors include vicarious learning, situation, reinforcement, and reciprocal determinism (Bandura, 1986; Edberg, 2020). Self-efficacy is a person's confidence in his/her ability to perform a behavior; behavioral capability includes a person's knowledge and skills to perform a behavior; outcome expectations reflect the likelihood and value of performing the behavior; self-control or self-regulation is a person's ability to control, to set goals, and to plan a behavior (Bandura, 1986; Edberg, 2020; Rimer & Glanz, 2005; Sharma, 2017). Vicarious learning or observational learning occurs as a result of one's observation of other people's behaviors; situation or environment includes the physical or social

circumstances or conditions around a person; reinforcement reflects positive or negative responses to a person's behavior, and reciprocal determinism is the influence of a person to and by the environment (Bandura, 1986; Edberg, 2020; Rimer & Glanz, 2005; Sharma, 2017).

Advantages of using SCT in youth-related food and nutrition interventions include the use of positive reinforcement and the ease with which SCT key constructs relate to real life situations (Greer, Davis, Sandolo, Gaudet, & Castrogivanni, 2018). Also, SCT can easily be applied in different settings and incorporates social and personal determinants in influencing behavior (Edberg, 2020; Greer et al., 2018). For example, youth-related food and nutrition interventions include the use of positive reinforcement, which is important to young people (Greer et al., 2018). Another advantage includes the ease with which SCT key constructs relate to real life situations, such as in farm-to-school programs (Berlin et al., 2013; Greer et al., 2018). Disadvantages of SCT include the complexity of its constructs, which limits its practical usage (Bandura, 1986; Edberg, 2020; Rimer & Glanz, 2005; Sharma, 2017). In their systematic review of the effectiveness of interventions that used SCT, Bagherniya et al. (2017) suggested weak evidence for the use of SCT in preventing or treating obesity in children. This is partly due to small sample sizes, not using all SCT constructs, shortened duration, and differences in educational content or methodologies during interventions. Despite those shortcomings, SCT has been applied in different health-related programs aimed at increasing confidence while performing a behavior, in predicting behavior, in modeling healthy behavior, etc. (Bandura, 1986; Edberg, 2020; Rimer & Glanz, 2005; Sharma, 2017). Taken together, these applications indicate that individual/internal characteristics and environmental/external factors that enhance and expose children to positive health behaviors impact weight-related outcomes in children.

Social Ecological Model

The Social ecological model, or ecological model, is a framework that explains how different factors at the individual, community, organizational, and societal levels intersect to influence personal choices such as food and physical activities (Bronfenbrenner, 1977, 1986; Edberg, 2020). Advantages of SEM/EM include the incorporation of different levels of influence on behaviors. Although SEM/EM is known to influence health behaviors at multiple levels, its complexity makes it difficult to explain the interaction of different variables in influencing behaviors (Edberg, 2020; Sallis, Owen, & Fisher, 2008). Additionally, the multilevel nature of the SEM/EM requires additional research skills which might slow down creativity or create unnecessary barriers in building partnerships (Wold & Mittlemark, 2018).

The use of SCT and SEM in childhood overweight/obese status prevention offers a foundation for creating broader initiatives to reduce childhood obesity by highlighting risk factors that seem to influence children's weight status.

Expanding on an ecological framework that emphasizes social and environmental changes at multiple levels, Wilson et al. (2017) reviewed the impact of evidence-based interventions that combined parental support, motivational and behavioral factors on weight loss of youth, especially those from underserved ethnic minority groups. In their study, they argued that positive parenting skills, autonomy support, and behavioral skill training influenced weight loss in children. Their findings are consistent with the growing number of studies that

demonstrate the impact of positive environments within the context of families, schools, communities, and healthcare settings on children's health-related behaviors.

Despite their central role in preventing childhood obesity, families are often left out in the planning phases of healthy living campaigns (Fiese & Bost, 2016). Fiese and Bost (2016) suggested the inclusion of families in the planning phases of healthy living campaigns by increasing families' partnerships with childcare settings, schools, parks, and other organizations that promote healthy lifestyles. While the aforementioned study applied a SEM/EM framework to identify factors that increased the risk of childhood overweight/obese status, another study, by Kellous, Sandalinas, Copin, and Simon (2014), tried to highlight unresolved issues of SEM/EM. The study evaluated to what extent integration of a SEM/EM approach into physical activity and sedentary behavior interventions has impacted their success on weight status (Kellous et al., 2014). Interestingly, the studies revealed the effectiveness of targeted physical activity determinants at different levels of the SEM/EM, including the social and organizational/built environment, in preventing obesity in youth (Kellous et al., 2014). Due to the wide variety of approaches used in interventions under review, Kellous et al. (2014) and Pratt et al. (2017) did not find conclusive outcomes about the specific components of interventions that were needed to achieve beneficial effects on obesity.

Summary

This paper focused on modifiable risk factors that are known to increase childhood overweight/obese status at the individual, behavioral and home environment levels. Family meals, sleep, and media use include behaviors that affect personal choices such as food/beverage consumption, (for example how much energy is consumed or expended) or the quality/quantity of sleep, which, in turn, are influenced by factors within a person's environment. As a relatively recent phenomenon, it is possible to reverse the increase in the number of children who are overweight and obese. SCT and SEM/EM have been extensively used in different interventions such as behavioral modification interventions. They both suggest that behavior can be influenced by individual and environmental factors. Compared to SCT, SEM/EM is more complex because it includes six levels of influence on behavior. Despite their disadvantages, SCT and SEM/EM have been successfully used in different settings. With that in mind, it is possible to adapt SCT and SEM/EM to different settings by focusing on their usefulness in changing behavior, by identifying outcomes that are influenced by specific constructs while recognizing the limitations of each.

References

Bagherniya, M., Taghipour, A., Sharma, M., Sahebkar, A., Contento, I. R., Keshavarz, S. A., Mostafavi Darani, F., & Safarian, M. (2017). Obesity intervention programs among adolescents using social cognitive theory: A systematic literature review. *Health Education Research*, *33*(1), 26–39. https://doi.org/10.1093/her/cyx079

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Prentice Hall.

Berge, J. M., Wall, M., Hsueh, T., Fulkerson, J. A., Larson, N., & Neumark-Sztainer, D. (2015). The protective role of family meals for youth obesity: 10-year longitudinal associations. *The Journal of Pediatrics, 166*(2)*,* 296-301. https://doi.org/10.1016/j.jpeds.2014.08.030

Berge, J. M., Beebe, M., Smith, M. C-M., Tate, A., Trofholz, A., & Loth, K. (2019). Ecological momentary assessment of the breakfast, lunch, and dinner family meal environment in racially/ethnically diverse and immigrant households. *Journal of Nutrition Education and Behavior, 51*(6)*,* 658-676. https://doi.org/10.1016/j.jneb.2019.03.002

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, *32*(7), 513–531. https://doi.org/10.1037/0003-066x.32.7.513

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, *22*(6), 723–742. https://doi.org/10.1037/0012-1649.22.6.723

Caldwell, A. R., Terhorst, L., Skidmore, E. R., & Bendixen, R.M. (2018). Is frequency of family meals associated with fruits and vegetables intake among preschoolers? A logistic regression analysis. *Journal of Human Nutrition and Dietetics, 31*(4)*,* 505-512. https://doi.org/10.1111/jhn.12531

Camp, N. L., Robert, R. C., Nash, J. E., Lichtenstein, C. B., Dawes, C., & Patterson, K. (2017). Modifying provider practice to improve assessment of unhealthy weight and lifestyle in young children: Translating evidence in a quality improvement initiative for at-risk children. *Childhood Obesity, 13*(3), 173–181. https://doi.org/10.1089/chi.2016.0124

Cruwys, T., Bevelander, K. E., & Hermans, R. C. J. (2014). Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite, 86,* 3-18. https://doi.org/10.1016/j.appet.2014.08.035

Dube, N., Khan, K., Loehr, S., Chu, Y., & Veugelers, P. (2017). The use of entertainment and communication technologies before sleep could affect sleep and weight status: A

population-based study among children. *International Journal of Behavioral Nutrition and Physical Activity*, *14*(1). https://doi.org/10.1186/s12966-017-0547-2

Edberg, M. (2020). *Essentials of health behavior: Social and behavioral theory in public health* (3rd ed.). Jones & Bartlett Learning.

Fiese, B. H., & Bost, K. K. (2016). Families ecologies and child risk of obesity: Focus on regulatory processes. *Family Relations, 65*(1)*,* 94-107. https://doi.org/10.1111/fare.12170

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

Gohil, A., & Hannon, T. S. (2018). Poor sleep and obesity: Concurrent epidemics in adolescent youth. *Frontiers in Endocrinology, 9,* 1-8. https://doi.org/10.3389/fendo.2018.00364

Greer, A. E., Davis, S., Sandolo, C., Gaudet, N., & Castrogivanni, B. (2018). Formative research to create a farm-to-school program for high school students in a lower income, diverse, urban community. *Journal of School Health, 88*(6), 453-461. https://doi.org/10.1111/josh.12627

Hart, C. N., Hawley, N., Davey, A., Carskadon, M., Raynor, H., Jelalian, E., Owens, J., Considine, R., &; Wing, R. R. (2016). Effect of experimental change in children's sleep duration on television viewing and physical activity. *Pediatric Obesity, 12*(6), 462–467. https://doi.org/10.1111/ijpo.12166

Jones, B. L. (2018). Making time for family meals: Parental influences, home eating environments, barriers and protective factors. *Physiology &; Behavior, 193*, 248–251. https://doi.org/10.1016/j.physbeh.2018.03.035

Kellous, N., Sandalinas, F., Copin, N., Simon, C. (2014). Prevention of unhealthy weight in children by promoting physical activity using a socio-ecological approach: What can we learn from intervention studies? *Diabetes & Metabolism, 40*(4), 258–271. https://doi.org/10.1016/j.diabet.2014.01.002

Lee, J., Kubik, M. Y., & Fulkerson, J. A. (2018). Media devices in parents' and children's bedrooms and children's media use. *American Journal of Health Behavior, 42*(1), 135–143. https://doi.org/10.5993/ajhb.42.1.13

Loth, K. A., Uy, M. J., Winkler, M. R., Neumark-Sztainer, D., Fisher, J. O., & Berge, J. M. (2019). The intergenerational transmission of family meal practices: A mixed-methods study of parents of young children. *Public Health Nutrition*, 1–12. https://doi.org/10.1017/s1368980018003920

Ogilvie, R. P., &; Patel, S. R. (2017). The epidemiology of sleep and Obesity. *Sleep Health, 3*(5), 383–388. https://doi.org/10.1016/j.sleh.2017.07.013

Reid Chassiakos, Y. (L., Radesky, J., Christakis, D., Moreno, M. A., Cross, C. (2016). Children and adolescents and Digital Media. *Pediatrics, 138*(5). https://doi.org/10.1542/peds.2016-2593

Rimer, B., K. & Glanz, K. (2005). *Theory at glance: A guide for health promotion practice* (2nd ed.). Bethesda, MD: U.S. Department of Health and Human Services, National Institute of Health, & National Cancer Institute.

Robinson, T. N., Banda, J. A., Hale, L., Lu, A. S., Fleming-Milici, F., Calvert, S. L., Wartella, E. (2017). Screen Media Exposure and obesity in children and adolescents. *Pediatrics, 140*(Supplement 2). https://doi.org/10.1542/peds.2016-1758k

Rogers, C., Anderson, S. E., Dollahite, J. S., Hill, T. F., Holloman, C., Miller, C. K., Pratt, K. J., & Gunther, C. (2017). Methods and design of a 10-week multi-component family meals intervention: A two group quasi-experimental effectiveness trial. *BMC Public Health*, *17*(1), 1471–2458. https://doi.org/10.1186/s12889-016-3908-x

Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. In Glanz, K., Rimer, B. K., & Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice, 4th ed.* (pp. 465-482). essay, John Wiley & Sons.

Schuler, B. R., & O'Reilly, N. (2017). Child development and the community environment: Understanding overweight across the income gradient. *Childhood Obesity*, *13*(6), 479–489. https://doi.org/10.1089/chi.2017.0025

Sharma, M. (2017). *Theoretical foundations of health education and health promotion,* (3rd ed.). Jones & Bartlett Learning.

Tanskey, L. A., Goldberg, J., Chui, K., Must, A., & Sacheck, J. (2018). The state of the summer: A review of child summer weight gain and efforts to prevent it. *Current Obesity Reports*, *7*(2), 112–121. https://doi.org/10.1007/s13679-018-0305-z

Wilson, D. K., Sweeney, A. M., Kitzman-Ulrich, H., Gause, H., & St. George, S. M. (2017). Promoting social nurturance and positive social environments to reduce obesity in high-risk youth. *Clinical Child and Family Psychology Review*, *20*(1), 64–77. https://doi.org/10.1007/s10567-017-0230-9

Wold, B., & Mittelmark, M. B. (2018). Health-promotion research over three decades: The social-ecological model and challenges in implementation of interventions. *Scandinavian Journal of Public Health*, *46*(20_suppl), 20–26. https://doi.org/10.1177/1403494817743893