

# Analysis Of the Influence of The Social Network on Childhood Obesity

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**Abstract.** Childhood obesity is a pressing global public health concern shaped by genetic, nutritional, lifestyle, and socio-economic factors. This study examines the influence of distinct social networks—family, neighborhood, internet, and social-cultural networks—on childhood obesity. To assess each network's impact, scrutinizing their contributing factors and interactions to inform effective policy development. The study employs a comprehensive literature review, incorporating data from Chinese and English sources. It utilizes the Social Ecological Model (SEM) to analyze the impact of the family network on childhood obesity and examines various factors within the neighborhood environment. The study also investigates the influence of internet social networks, particularly through social media influencer marketing, and explores the impact of social and cultural networks, with a focus on China and the United States. The family network significantly influences childhood obesity, with factors like parental characteristics, age, race, and gender exhibiting associations. Proximity to food outlets and physical activity facilities within the neighborhood plays a key role. Internet social networks can sway children's dietary choices, with influencers promoting unhealthy foods leading to increased consumption. Social and cultural networks in different contexts contribute, influenced by traditional beliefs and migration dynamics. This study underscores the intricate and multifaceted influence of social networks on childhood obesity, highlighting the roles played by each network in shaping children's weight status and dietary choices. Understanding these network dynamics is vital for designing effective prevention and intervention strategies.

**Keywords:** Childhood obesity; social networks; parental influence; dietary choices.

## 1. Introduction

With social and economic progress, the number of overweight and obesity cases in children has generally increased globally and has evolved into a public health challenge of worldwide concern. In addition to being influenced by genetic factors, overweight and obesity in children are also related to factors such as nutrition, family lifestyle, and socio-economic status [1]. But obviously, all factors are related to different networks.

From the perspective of four social networks with different influence areas, this study searched relevant Chinese and English literature on CNKI and Google Academic, listed the influencing factors of childhood obesity in all the screened literature, and classified them into the corresponding social network analysis section (2.1-2.4). The influence degree of different influencing factors under the same social network is compared to explain the relationship between each influencing factor and childhood obesity (positive correlation, negative correlation, or no correlation) and their interaction, so as to provide help for the formulation of relevant guidelines and policies.

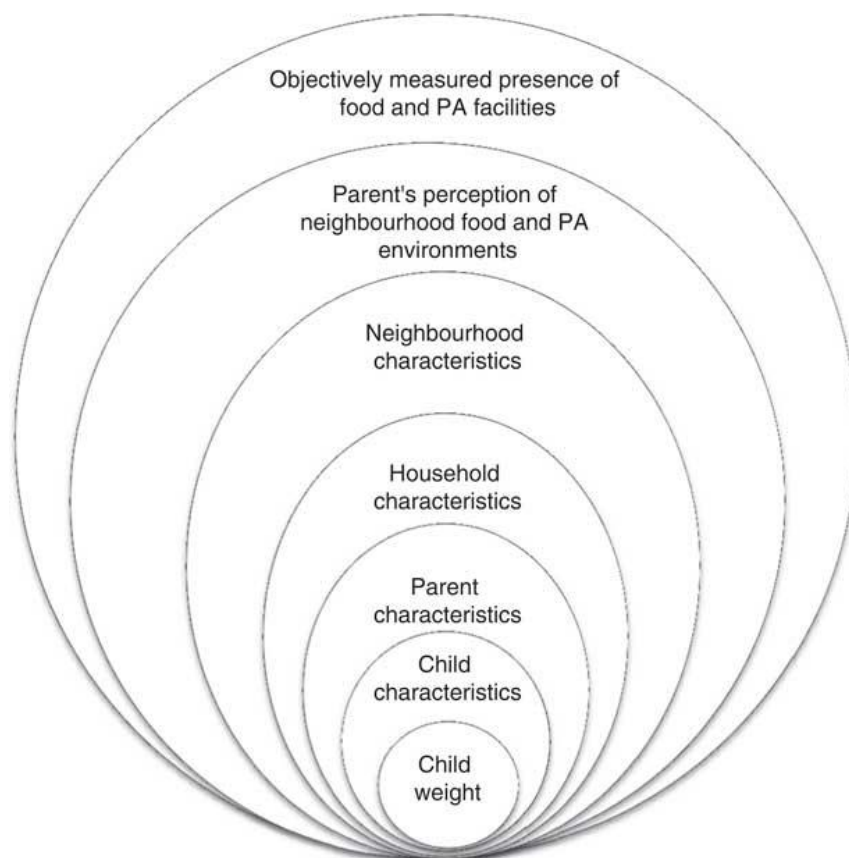
## 2. Analysis of the Influence of Social Networks on Childhood Obesity

### 2.1. Family Network

The 2005 medical research report "Preventing Childhood Obesity: Health in the Balance" employed a socio-ecological model (SEM) to explore potential causes of the childhood obesity epidemic and provide a basis for possible future intervention strategies [2,3]. According to ecosystem theory and SEM hypothesis, an individual's outcome change is not only determined by personal characteristics such as age and sex, but also influenced by the interactions in the social, cultural,

economic and environmental networks in which they live [3-5]. SEM is therefore widely used in the field of childhood obesity research and prevention initiatives, and it describes concentric layers of influence covering the individual, interpersonal, community, organizational, governmental, industrial, and social domains [6-8].

Through a cross-sectional study, the researchers randomly selected children from economically disadvantaged and culturally diverse communities. In this study, structural equation model (SEM) was used to analyze the collected data at different levels. Each data corresponds to a different level within the SEM [3]. The primary aim is to scrutinize both the distinctive and comparative impact of each stratum on the weight status of children [3].



**Fig. 1** The layers influencing a child's weight status [3]

As shown in figure 1, scholars have delved into the examination of individual factors situated within various tiers of the SEM to gain insights into how these factors affect the weight status of children [3]. A child's weight status is correlated with a number of factors, including age, race and gender. In addition, parental attributes can also have an impact on a child's weight, such as their BMI and education level. Family characteristics such as income are also associated with a child's weight [3]. Obviously, the important factors in the family network are the key factors in the community environment network. The findings suggest that community-level factors include proximity to various types of food exports and physical activity facilities (PA), which leads to a more diverse and uncertain pattern [3].

The factors of family networks that lead to childhood obesity are: 6-11-year black boys, higher parents' BMI, lower level of mother's education, poor family without participating in SNAP, and food security. Moreover, the factor of parents' opinion—safety from traffic and crime in neighborhood /parks and PA facilities available in the neighborhood is also included. According to current data and research findings, parental characteristics demonstrate the most robust association in comparison to other factors [3].

## 2.2. Neighborhood Environmental Network

In one study, Ohri-Vachaspati et al. found that during 2009-2010, they randomly selected another subset of participants from a sample of households in four low-income, racially diverse communities in New Jersey, USA. By comparing survey data, they found that children living in mixed neighborhoods had the lowest prevalence of overweight/obesity (OW/OB) at 27.9 percent, compared with 31.0 percent in high-income neighborhoods [3]. Of the children living within 0.40 km, 44% were overweight or obese. That compares with 25.6 percent among those children who were closer [3].

The results of another literature indicated that factors related to the quantity, variety, and proximity of food stores and restaurants in the neighborhood of family residences or schools were linked to weight status, waist circumference, and obesity risk among children [9]. The presence of fast-food restaurants and convenience stores exhibited positive correlations with the risk of childhood obesity, while the availability of supermarkets and free markets was associated with a decreased risk of overweight and obesity in children [9]. Notably, for each additional composite grocery store located within a 1-kilometer radius of the home, there was a 10% increase in the risk of overweight and obesity in children [9].

## 2.3. Internet Social Network

The Internet social network is a vast network. In discussing the impact of online socializing on the problem of childhood obesity, one interesting, randomized trial can be cited that was designed to assess the impact of social media marketers associated with healthy and unhealthy foods on children's dietary intake [10].

As a result, children exposed to influencers featuring unhealthy snacks exhibited a notable rise in their overall intake and a significant increase in the consumption of unhealthy snacks specifically, in comparison to children who were exposed to influencers endorsing nonfood products (with intake levels of 357.1 kcals and 292.2 kcals, respectively) [10]. In addition, the study found that food-related cues in the advergaming led to an increase in overall calorie intake in children, regardless of whether the cues involved foods high in saturated fat, salt and/or sugar (HFSS) or fruit. [10].

Previous research findings have demonstrated the potent influence of televised food advertising on children's eating habits [10]. Additionally, even cues related to food within advergames, regardless of whether they pertain to high-saturated fat, high-salt, and/or high-sugar (HFSS) foods or fruits, have been observed to trigger an overall increase in calorie intake among children [10-12]. However, Coates showed that popular social media influencer promotion of food affects children's food intake [10].

## 2.4. Social and Cultural Network

In terms of the influence of social and cultural networks on childhood obesity, the two networks that deserve the most attention and research are social and cultural networks in China and the migrant network in the United States.

In China, the traditional concept of "fat is strong" and the traditional concept of diet are the cultural background leading to childhood obesity [13]. And people's values often lag behind the speed of socio-economic development, which is an important reason for childhood obesity [13]. The emergence of the one-child system makes family ties closer, children's status in the family rises, and the tendency of parents to spoil children and lead to obesity is strengthened [13].

In contrast, the effect of migrant networks on childhood obesity is complex. The stress associated with migration can induce substantial changes in energy metabolism, often leading to increased consumption of affordable, calorie-dense, and sugar-rich comfort foods within migrant families [14]. This phenomenon, in turn, poses a significant risk factor for childhood obesity.

Furthermore, the process of acculturation into the host country's culture can be intertwined with the issue of childhood obesity [14]. Vilar-Compte suggests that adapting to mainstream American culture may be associated with the adoption of obesogenic dietary patterns characterized by increased intake of ultra-processed foods and beverages.[14].

There is a correlation between the immigrant relationship of Mexican families in the United States and the degree of exposure to U.S.-centric social norms, and the prevalence of overweight and obesity in children [14,15]. Some researchers found that children who lived in Mexico but had immigrant ties were more likely to be overweight or obese than Mexican children who did not have a family network in the United States [14,16]. This association was more pronounced and statistically significant in children with extended family networks than those with closer ties [14,16].

Friends had a greater impact on obesity than siblings and spouses, with a 57 percent risk compared to 40 percent for siblings and 37 percent for spouses [14,17]. When only same-sex friendships were considered, the likelihood of obesity was found to increase, while opposite-sex friendships had no significant effect [14]. This idea emphasizes that individuals are more susceptible to being influenced by others who are similar to them than by being isolated [14]. Therefore, expanding the social network to include participants with horizontal relationships like Cousins may have a more significant and meaningful impact than asymmetrical relationships consisting primarily of parents [14].

### 3. Discussion

Table 1 provides a concise overview of the research findings related to the influence of different social networks on factors contributing to childhood obesity. It compares initial assumptions with the actual research results to elucidate the complexities of these relationships within the context of family, neighborhood, internet, and social-cultural networks.

**Table 1.** Impact of Social Networks on Childhood Obesity Factors

	Assumptions	Research Results
Family Network	Parents' opinions had no effect on childhood obesity.	Parents believe that the community is safe, which leads to childhood obesity.
Neighborhood Environmental Network	Too many stores in the neighborhood.	Lack of PA facilities and parks. Short of shopping channels except for convenience stores.
Internet Social Network	Children follow the trend of purchasing food recommended by influencers on Internet social networks, regardless of whether they are healthy or not.	Influencers promoting healthy foods cannot affect children's choices or intake of those foods.

#### 3.1. Family Network

Assumption: Parents' opinions had no effect on childhood obesity. Research Results: Contrary to the assumption, the research indicates that parents who believe that the community is safe tend to contribute to childhood obesity. This highlights the importance of understanding parental attitudes and their potential influence on children's health.

#### 3.2. Neighborhood Environmental Network

Assumption: Too many stores in the neighborhood would contribute to childhood obesity. Research Results: The research suggests that childhood obesity is associated with the lack of physical activity (PA) facilities and parks in the neighborhood, as well as a shortage of shopping channels beyond convenience stores. This highlights the significance of the neighborhood environment, beyond just the density of stores.

### 3.3. Internet Social Network

Assumption: Children would follow the trend of purchasing food recommended by influencers on Internet social networks, regardless of their healthiness. Research Results: The study finds that while children are influenced by social media influencers, the type of food promoted matters significantly. Influencers promoting unhealthy foods lead to increased consumption, whereas those endorsing healthy foods do not substantially impact children's dietary choices. This emphasizes the selective nature of influencer impact on children's diets. These findings underscore the multifaceted nature of social networks' influence on childhood obesity. This table underlines the importance of scrutinizing initial assumptions about the influence of different social networks on childhood obesity. It showcases the nuanced relationships and reveals the complexities of these interactions, providing valuable insights for future research and the development of targeted strategies to combat childhood obesity.

## 4. Conclusion

This article explores the intricate relationship between various social networks and childhood obesity, and how these networks influence the weight status of children. It highlights the global rise in childhood overweight and obesity, influenced not just by genetics but also by family, neighborhood, internet, and social-cultural networks.

Family networks play a crucial role, with factors like age, race, gender, parental attributes, and household characteristics consistently linked to childhood obesity. Notably, parental characteristics are strongly associated with childhood obesity.

The neighborhood environment also affects childhood obesity, with proximity to food outlets and physical activity facilities impacting children's weight. Children in lower-income neighborhoods and those living near convenience stores tend to have a higher prevalence of overweight and obesity.

The influence of social media, a vast network, is examined through a study involving social media influencer marketing. Exposure to influencers promoting unhealthy snacks on social media led to increased intake of unhealthy foods among children. However, influencers promoting healthy foods did not significantly impact children's dietary choices.

Social and cultural networks in different contexts, such as China and the United States, also contribute to childhood obesity. In China, traditional beliefs, including "fat is strong," and changing values influence childhood obesity. In the U.S., migrant networks face complex dynamics, including changes in energy metabolism due to migration stress and acculturation into obesogenic dietary patterns.

In conclusion, this article underscores the multifaceted nature of networks and their significant impact on childhood obesity. It emphasizes the strong association between parental characteristics and childhood obesity and suggests that friends might have a more substantial influence on dietary choices than family. Understanding these network dynamics is essential for effective prevention and intervention, even though quantifying each factor's contribution remains challenging.

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