



# Implications of fast food restaurant concentration for preschool-aged childhood obesity<sup>☆</sup>



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## ABSTRACT

In this research, the authors examine the effects on preschool-aged childhood obesity rates associated with the direct and moderating influence of fast food restaurant density levels, consumer poverty, and urbanization. Results show that higher levels of fast food restaurant saturation are associated with increased levels of childhood obesity in both urban and poor areas, with the largest negative effect of fast food availability on obesity occurring in more economically disadvantaged, urban areas. Findings highlight why the societal impacts of targeting vulnerable populations through corporate location selection strategies should be fully considered in social marketing initiatives, especially given that unhealthy products with long term health risks are increasingly accessible.

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## 1. Introduction

The increasing tendency to eat food prepared outside the home, especially fast food, has been one of the most significant changes in food consumption over the past 50 years (Binkley, 2006). Food purchases outside the home now account for nearly 50% of Americans' total yearly food expenditures (Economic Research Service/United States Department of Agriculture (ERS/USDA), 2009; National Restaurant Association (NRA), 2012). In addition, almost one out of every three children eats fast food on a daily basis, a rate that has increased more than fivefold since 1970 (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004). Considering the fact that childhood obesity has more than tripled over the past generation, a better understanding of the potential effects of these long-term trends on children's health and welfare is needed (Centers for Disease Control and Prevention [CDC], 2012). Children now develop adult disorders, such as hypertension and type 2 diabetes, rarely observed in prior generations (Goran, Ball, & Cruz, 2003). Further, obese children and teens face a high likelihood of becoming obese adults (CDC, 2012). The childhood obesity epidemic has both immediate and long-term detrimental effects on the health and well-being of millions of

Americans (Elbel, Gyamfi, & Kersh, 2011; Grier, Mensinger, Huang, Kumanyika, & Stettler, 2007).

The prevalence of both childhood and adult obesity rapidly increased over the same time period that the number of fast food restaurants more than doubled (e.g., Nielsen, Siega-Riz, & Popkin, 2002). Very young children living in lower income, urban communities where access to healthy food options may be more limited (CDC, 2012) are especially at risk. Today, 14% of lower-income, preschool-aged children are obese, and one-third are considered either overweight or obese (CDC, 2012). Consequently, many in the marketing and consumer health communities are concerned about the relationship between fast food consumption and childhood obesity. Prior research has examined the impact of fast food bundling (Sharpe & Staelin, 2010), pricing (Khan, Powell, & Wada, 2012), and advertising (Hudson, Hudson, & Pelozo, 2008) on children's health and welfare. However, the implications associated with restaurant location decisions, a subtler component of the strategic marketing process, have largely been ignored. While prior literature suggests that greater fast food consumption is indeed related to greater weight gain and obesity (Niemeier, Raynor, Lloyd-Richardson, Rogers, & Wing, 2006; Pereira et al., 2005), studies examining the specific relationship between fast food availability and obesity show mixed results. Further, information regarding how a high concentration of fast food outlets may negatively affect young children's health is extremely limited (Fleischacker, Evenson, Rodriguez, & Ammerman, 2011).

As questions regarding the social impact of fast food marketing tactics continue to mount (Center for Science in the Public Interest

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(CSPI, 2008; Food Research and Action Center, 2012), research is needed to provide greater insight into the relationship between fast food accessibility and the development of early childhood obesity. More specifically, a better understanding of how environmental factors may influence childhood obesity is necessary to develop more effective interventions to reduce the problem (Salois, 2012; Sturm & Cohen, 2009). Preschool aged children, whose obesity rates across the U.S. range from 10 to 15% or higher (CDC, 2012), represent a particularly vulnerable consumer group and serve as the focus of the present study (CDC, 2012; CSPI, 2008). Thus, the current research considers fast food accessibility as an element of the built environment and examines how two specific environmental factors, poverty and urbanization levels, may moderate the relationship between fast food accessibility and preschool childhood obesity rates. Based on the findings, several public policy and social marketing initiatives are proposed that may help communities better address the problem of early childhood obesity.

## 2. Literature review

### 2.1. Fast food accessibility and the built environment

Traditionally, urban planners have shown the majority of interest in built (i.e., man-made) environments. However, marketers and consumer health advocates have recently devoted considerable attention to built environments (for a review see Ding & Gebel, 2012). One key aspect of built environments is the type and concentration of retail establishments available to consumers (Papas et al., 2007). Prior research on the relationship between retail type, concentration, and consumer health largely focuses on a lack of healthy retail establishments, rather than on the high concentration of unhealthy establishments. For example, researchers have previously focused on food deserts – communities that lack easily accessible and affordable healthy foods (Cummins & Macintyre, 2002). However, little research attention has been devoted to food swamps, or areas characterized by the high accessibility of *unhealthy* foods (Ver Ploeg, 2010). Relatively easy access to less healthful food (such as fast food) may also have a significant impact on national obesity levels (Ver Ploeg et al., 2009).

Franchising has played a key role in the enormous growth of fast food availability around the United States (Ni & Alon, 2010). Currently, over 300,000 fast food restaurants serve over 50 million consumers each day (Pew Research Center, 2012). The location of a retail establishment can be a critical determinant of financial success, especially in the fast food industry where restaurant sites are often strategically selected to increase convenience and maximize long term profits (Karande & Lombard, 2005; Thomadsen, 2007). McDonald's, in particular, has traditionally focused on a strategy centered around high accessibility (Jekanowski, Binkley, & Eales, 2001). This strategy is rooted in the philosophy that the overall number of transactions per capita in a specific market increases as the number of McDonald's restaurants increases (Samuels, 1996). In general, research supports the assumption that greater availability of fast food is associated with increased consumption (Jekanowski et al., 2001). Given the large number of firms providing unprecedented access and convenience, the fact that fast food sales in the United States have skyrocketed from \$16 billion in 1975 to \$190 billion in 2012 is not surprising (Hoovers, 2013). Americans now spend more money on fast food than on books, movies, magazines, newspapers, videos, and recorded music, combined (Schlosser, 2000).

The extensive marketing efforts used by fast food firms to attract and retain customers greatly contribute to the success of the industry. Promotional activities associated with fast food often target vulnerable populations such as the socioeconomically disadvantaged (Larson, Story, & Nelson, 2009). Fast food marketers highlight value and cost savings to appeal to these targeted customers, and further emphasize that fast food products are easy and convenient meal solutions that minimize search and decision costs (Chandon, Wansink, & Laurent, 2000).

### 2.2. Fast food and children

In the 1980s, U.S. companies spent \$100 million annually marketing to children; now they spend more than \$17 billion (Lagorio, 2009). Television is the most popular fast food advertising medium; the average preschooler sees 2.8 advertisements for fast food per day (Powell, Schermebeck, Szczypka, Chaloupka, & Braunschweig, 2011). Children's heavy exposure to fast food advertising is especially troubling since only a small number of children's meal combinations meet established nutrition criteria for children, and even fewer meals meet specific nutrition standards for preschool children (Harris, Schwartz, & Brownell, 2010).

Fast food firms also locate restaurants in areas that are easily accessible to families with children. For example, prior research shows that fast food restaurants tend to be clustered in school neighborhoods. More specifically, 37% of schools nationwide are within walking distance of at least one fast food restaurant (Zenk & Powell, 2008). One study in Chicago shows that there are three to four times as many fast food restaurants within 1.5 km of schools than would be expected if the restaurants were randomly located throughout the city (Austin et al., 2005). Low-income communities, in particular, tend to have an even greater availability of fast food restaurants near schools (Fleischhacker et al., 2011; Larson et al., 2009).

## 3. Conceptual development

### 3.1. Fast food and the economically disadvantaged

Fast food restaurants have historically operated on very modest profit margins, and most of their profitability comes from the sale of traditional fast food menu items such as cheeseburgers, French fries, and high calorie soft drinks (Zmuda, 2012). This pattern of sales may be, in part, attributable to the strategic low pricing of unhealthy items, compared to price premiums placed on more nutritious foods. For example, nearly all fast food firms have adopted everyday low-pricing strategies that offer an assortment of low priced foods (e.g., Sonic's Everyday Deals and Taco Bell's Why Pay More Menu). These lower-price, higher-value offerings appeal to economically disadvantaged consumers and often tend to be relatively unhealthy. As a result of such pricing tactics, the fast food industry has come under fire for stalking the poverty consumer (Hill, 2002).

The practice of targeting lower income customers has led some to question whether differences in food access across socioeconomic status contribute to existing health disparities (Diez-Roux, 2009; Ver Ploeg et al., 2009). Prior research suggests that socioeconomic variables are more strongly related to exposure to fast food outlets than to supermarkets, with higher fast food exposure in more socially deprived areas (Smoyer-Tomic et al., 2008). More specifically, Larson et al. (2009) report that the availability of fast food tends to be greater in lower income neighborhoods than in higher income neighborhoods. In fact, research shows that residents of more socially deprived neighborhoods only have to travel half the distance to fast food outlets, on average, compared to residents of less socially deprived neighborhoods (Pearce, Blakely, Witten, & Bartie, 2007). For example, Powell, Chaloupka, and Bao (2007) examine fast food concentration in 28,000 U.S. ZIP codes and demonstrate that lower-income ZIP code areas had 1.3 times the number of fast-food restaurants than higher-income ZIP code areas. Therefore, the relationship between fast food availability and childhood obesity may be stronger in poorer areas relative to areas not characterized by persistent poverty.

### 3.2. Fast food and urbanization levels

Recent reviews examining health disparities also suggest important differences in obesity rates based upon other environmental factors such as urbanization levels (e.g., Ahern, Brown, & Dukas, 2011; Trivedi, 2011). As previously mentioned, many urban areas are often

referred to as food deserts due to the lack of availability and affordability of healthy foods (Cummins & Macintyre, 2002). Conversely, urban areas may also be referred to as food swamps due to the amount of *unhealthy* food (e.g., fast food) readily available to residents (Ver Ploeg, 2010). Indeed, prior research indicates that urban residents typically have more restaurant options than rural residents, overall, as well as a higher proportion of fast food to total restaurant options (Powell et al., 2007). A review by Fleischhacker et al. (2011) finds similar discrepancies in fast food access between rural and urban settings across a number of studies. Lastly, the urban poor are frequently forced to purchase more food prepared away from home because they often lack proper cooking facilities (Popkin & Bisgrove, 1988). Not surprisingly, childhood obesity rates are often higher in urban areas compared to more rural areas (e.g., Wang & Lobstein, 2006). These considerations lead us to assess whether the relationship between fast food availability and childhood obesity is stronger in more urban areas relative to more rural areas.

Finally, this review of the literature suggests that the availability of fast food restaurants may interact with both poverty and urbanization levels to influence the prevalence of preschool childhood obesity. Prior research which indicates higher levels of fast food availability in lower income, urban areas compared to higher income, urban areas supports the relationships between fast food restaurant availability, poverty, and urbanization (Powell et al., 2007). Thus, both poverty level and location may moderate the relationship between fast food availability and preschool childhood obesity. More specifically, the relationship between fast food restaurant availability and obesity may be strongest in urban locations where there is persistent poverty.

#### 4. Methods

This research uses secondary data sources to conduct cross-sectional, county-level analyses of the relationship between the availability of fast food restaurants, poverty level, locale (urban versus rural) and preschool childhood obesity rates. In addition to the main independent variables of interest, a number of covariates that prior research has found to be potential risks for childhood obesity (e.g., adult obesity rate, teen birth rate) are included in the model. Data were obtained from several sources, including the US Department of Agriculture (USDA) Economic Research Service (ERS) Food Environment Atlas and merged with County Health Rankings data compiled by the Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute. Data address effects on preschool childhood obesity rates for 2718 U.S. counties used as observations in the analyses.

More specifically, the dependent measure of low-income preschool obesity rate (drawn from the Food Atlas) was originally gathered by the CDC analysis of height and weight data from the Pediatric Nutrition Surveillance System (PedNSS). For this county-level data, the CDC combined the 2007–2009 PedNSS data for children two to four years of age. A more complete description of the CDC's procedure is provided elsewhere ([www.cdc.gov/pednss/index.htm](http://www.cdc.gov/pednss/index.htm)).

The primary independent variables of interest are: (1) the per capita number of fast food restaurants, (2) the level of urbanization (rural versus

urban), and (3) economic environment (persistent poverty present versus persistent poverty not present). Of particular concern is how these environmental factors interact with per capita fast food restaurant concentration to influence childhood obesity prevalence. All three sets of measures are taken from the Food Environment Atlas. The ERS determined the relative prevalence of fast food restaurants per 1000 county residents from the U.S. Census Bureau, County Business Patterns, 2008. Metropolitan and nonmetropolitan (i.e., urban and rural) areas were identified based on the definition used by the Office of Management and Budget (OMB). A detailed explanation of the procedures used by the ERS and OMB to determine urbanization can be found on-line (ERS, 2012). Counties are identified as having persistent poverty if the poverty rate of residents was 20% or more in each decade since 1970 based on the U.S. Census Bureau estimates.

Covariates previously identified as influencing childhood obesity rates are also included as control variables in the model. The *U.S. Census Bureau, Small Area Income and Poverty Estimates—2008 Data* provides the county level median household income, whereas the *U.S. Census Bureau, 2008 County Population Estimates* offers the race data. The *National Center for Health Statistics 2001–2007* and the National Center for Education Statistics' *National Assessment of Adult Literacy 2003* provide the teen birth rates and illiteracy rates, respectively. Lastly, the CDC offers the adult obesity estimates, which are described in detail elsewhere (see CDC, 2010a; ERS, 2012). Means, standard deviations and correlations for these variables are shown in Table 1.

#### 5. Results

The independent variables were mean-centered prior to creating the interaction terms of interest. Then, a hierarchical regression analysis examines direct and interactive effects of the predictors on preschool childhood obesity rates. The control variables (e.g., adult obesity rate, illiteracy rate) were entered in the first model, and the direct effects of the predictors of interest were hierarchically added. The two-way and three-way interactions were included in subsequent models.

Results of these analyses are presented in Table 2. As shown by results in the first model (see column 1) in which control variables are entered in the hierarchical regression, obesity rates are associated with several socio-demographic control variables ( $F(5,2713) = 28.5$ ;  $R^2 = .050$ ;  $p < .001$ ). Specifically, the county-level adult obesity rate, illiteracy rate, median income, and teenage birth rate are all positively related to preschool childhood obesity prevalence ( $p < .01$  for each). While these direct relationships may be of interest to public policy and public health researchers, the primary focus of the present research concerns how the availability of fast food restaurants (per 1000 residents) interacts with (persistent) poverty rates and urbanization (i.e., urban vs. rural communities). Results for the inclusion of these focal variables and their interactions are shown as incremental effects beyond the control variables, and coefficients are reported in the far right portion of the table. As shown by these coefficients and t-values in Table 2, there is not a substantial amount of incremental variance explained by the direct effects ( $F\text{-change} = 0.86$ ;  $R^2 = .051$ ;  $p > .10$ ),

**Table 1**  
Means, standard deviations, and correlations for study variables.

	Mean	SD	1	2	3	4	5	6	7	8	9
1 Adult obesity rate	28.9	3.71	1.00								
2 Teen birth rate	48.3	21.07	0.41	1.00							
3 Illiteracy rate	13.0	6.17	0.26	0.63	1.00						
4 Median income	44,161.3	11,445.34	−0.45	−0.54	−0.40	1.00					
5 % White	79.2	19.39	−0.18	−0.54	−0.71	0.10	1.00				
6 Per capita fast food restaurants	0.8	0.62	−0.37	−0.31	−0.25	0.09	0.19	1.00			
7 Persistent poverty	0.1	0.33	0.36	0.43	0.48	−0.42	−0.44	−0.18	1.00		
8 Urban/rural	0.4	0.48	−0.11	−0.19	−0.09	0.49	−0.09	−0.16	−0.18	1.00	
9 Preschool obesity rate	14.1	3.63	0.12	0.15	0.17	−0.02	−0.13	−0.08	0.08	0.00	1.00

**Table 2**  
Hierarchical regression results: Effects on preschool childhood obesity prevalence.

	Control variable model				Incremental effects		
	Model statistics	Unstandardized coefficient	Standardized coefficient	t-Value	Unstandardized coefficient	Standardized coefficient	t-Value
<i>Control variables</i>							
Adult obesity rate		.12	.12	5.60**	.14	.14	5.79**
Teen birth rate		.02	.11	3.88**	.02	.11	3.97**
Illiteracy rate		.10	.17	5.38**	.10	.18	5.53**
Median income		.05	.17	6.64**	.06	.18	6.15**
% White		.01	.06	1.74	.01	.06	1.83
Model F-value	28.5**						
Model R <sup>2</sup>	.050						
<i>Direct effects</i>							
Per capita fast food restaurants (PCFFR)		–	–	–	.48	.06	2.21*
Persistent Poverty (PP)		–	–	–	.30	.03	.73
Urban/rural (U/R)		–	–	–	.00	.00	.01
Model F-value (F-change)	18.1** (0.86)				.97	.05	2.08*
Model R <sup>2</sup> (R <sup>2</sup> -change)	.051 (.001)				–.05	–.00	–.05
<i>2 and 3-way interactions</i>							
PCFFR * PP		–	–	–	1.99	.08	2.11*
PCFFR * U/R		–	–	–	.97	.05	2.08*
PP * U/R		–	–	–	–.05	–.00	–.05
PCFFR * PP * U/R		–	–	–	5.19	.08	2.09*
Model F-value (F-change)	13.6* (4.36**)						
Model R <sup>2</sup> (R <sup>2</sup> -change)	.057 (.006**)						

Note: Hierarchical regressions are performed with control variables entered in an initial stage, direct effects of primary predictors of interest entered in model two, with subsequent entry of the two-way and three-way interactions. Sample size = 2718; Final Model F(12,2706) = 13.6;  $p < .0001$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

but the addition of the two and three-way interactions between these variables explains a small yet statistically significant amount of additional variance (F-change = 4.36;  $p < .01$ ;  $R^2 = .057$ ). More specifically, the addition of the two-way interactions to the model including only control variables and direct effects of the predictors results in a significant incremental effect on the preschool childhood obesity rate (F-change = 4.35;  $p < .01$ ). In addition, as shown in Table 2 the coefficient of the three-way interaction entered in the final stage of the hierarchical regression is significant ( $\beta = 5.19$ ;  $t = 2.09$ ;  $p < .05$ ), indicating an effect beyond the model including control variables, the direct effects, and two-way interactions (F-change = 4.37;  $p < .05$ ). Plots for the two-way interactions are shown in Fig. 1, and the plot for the significant three-way interaction is offered in Fig. 2.

Panel A in Fig. 1 indicates that there is not a significant association between the prevalence of fast food restaurants per capita and preschool childhood obesity percentage rates in rural communities. However, in more urbanized communities, the relationship between fast food per capita and the childhood obesity rate is significant ( $p < .01$ ). Similarly, as shown in Panel B, the prevalence of fast food restaurants is not related to preschool childhood obesity rates in counties with lower levels of neighborhood deprivation (i.e., counties without persistent poverty). Conversely, in areas afflicted with persistent poverty, the availability of fast food restaurants is positively associated with preschool obesity rates.

A significant three-way interaction ( $\beta = 5.19$ ;  $t = 2.09$ ;  $p < .05$ ) further qualifies both of these two-way interactions. As shown in Fig. 2, the relationship between the availability of fast food restaurants per capita and low-income, preschool obesity rates is only significant ( $p < .01$ ) when there is a combination of persistent poverty and high urbanization (i.e., when the county is classified as being an urban area). The fast food restaurant per capita has little effect on childhood obesity rates in other combinations of urbanization and poverty rates. These interactions illustrate why direct effects of the density of fast food restaurants (in isolation) often may not show a significant relationship with obesity rates, and further, why researchers should more fully consider the effects of combinations of environmental and socioeconomic factors.

## 6. Discussion

Fast food executives have long recognized the potential to maximize profits by selecting restaurant sites that are convenient and accessible to their targeted customer bases (Austin et al., 2005). However, few have considered how this strategy may potentially influence the health and welfare of very young children. The goal of the present research is to examine the impact of fast food availability on childhood obesity in vulnerable preschool children populations – namely the poor and the urban. To date, empirical evidence linking the availability of fast food restaurants to obesity is limited, especially among younger children. Further, much of the existing research only considers the direct effects of individual, environmental, and social factors (Dubowitz et al., 2008).

The present study takes into account the interactive effects of several key factors to demonstrate how more vulnerable populations may face greater health risks. Overall, there is little impact of the direct effects, and although significant, the variance explained by the interactions is small, and the standardized coefficients associated with these focal interactions are smaller than those for most of the control variables. Despite this, the results suggest that a higher level of fast food restaurant saturation may lead to increased prevalence of childhood obesity in more economically disadvantaged, urban areas. These findings support previous research that demonstrates significant disparities in childhood obesity rates across different urbanization and socioeconomic control variables (Ahern et al., 2011; Block, Scribner, & DeSalvo, 2004; Food Research and Action Center, 2012). The fact that much of the existing obesity research only considers the direct effects of individual, environmental, and social factors on obesity prevalence (Dubowitz et al., 2008) may provide insight as to why the present findings are in contrast to some prior studies that have not found such relationships. Differences may also stem from variance in the geographic areas of the studied populations, as well as the number, definition, and exact combination of environmental and control factors used in the different analyses (Fleischhacker et al., 2011; Salois, 2012). In addition, relatively few studies consider how the built environment affects the health of children (Salois, 2012), and even fewer specifically assess how the built

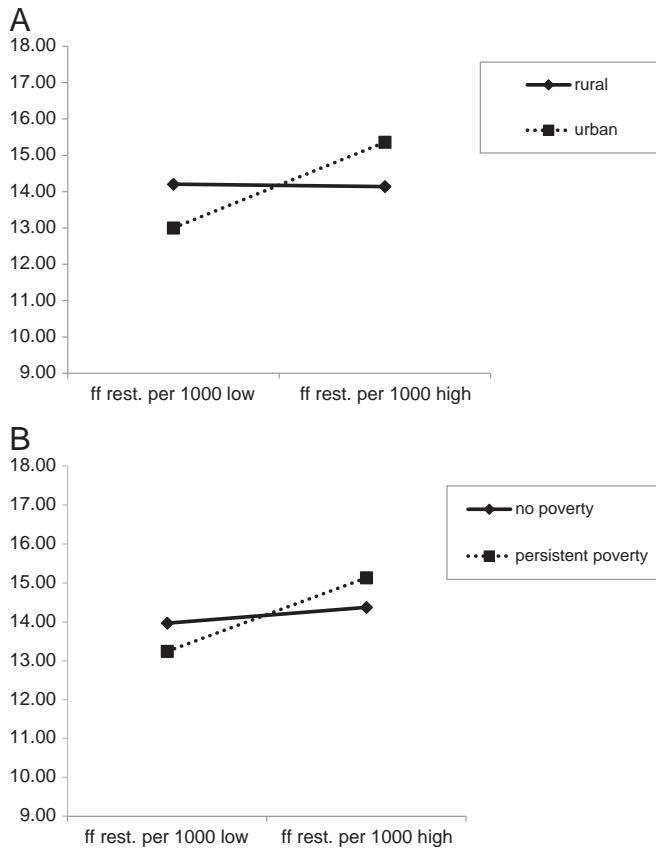


Fig. 1. Two-way interactions: effects of fast food accessibility, urbanization, and poverty on preschool childhood obesity prevalence.

environment interacts with other socioeconomic and environmental factors (such as urbanization and poverty levels) to influence health. Thus, the present findings highlight the importance of adopting a more holistic perspective when investigating the impact of fast food accessibility on the U.S. childhood obesity epidemic.

6.1. Consumer health and public policy initiatives

The Patient Protection and Affordable Care Act of 2010 requires all U.S. chain restaurants with 20 or more outlets to list calorie information on menus and menu boards to better educate consumers about the healthfulness of their food choices (Government Printing Office, 2010). Prior research indicates that nutrition information disclosures such as these may help consumers make more informed choices (Burton, Howlett, Kees, & Huggins, 2006). However, the effectiveness of such public policy and industry information-based initiatives for childhood obesity remains an open question, particularly in more vulnerable populations with low health literacy levels. Further, such an approach provides more transparency about the (un)healthfulness of fast food, but does nothing to make the food any less accessible.

The results of this research suggest that greater attention should be paid to the relationship between built environments and consumer health. Mikkelsen and Chehimi (2006) note a strong need to examine how local policies, such as land use and zoning laws, may be implemented in ways that promote consumer health. For example, the Los Angeles City Council passed an ordinance in 2008 that prohibited the construction of new fast food restaurants near low-income communities. Other communities have since made similar decisions; some have even banned all new fast food restaurant construction (Alterio, 2013).

While certain environmental factors such as urbanization and poverty are more difficult to address, public policy approaches such as these

recognize that changes to the built environment may be a practical, alternative way to address public health concerns. Thus, limiting fast food access in poorer urban areas through zoning regulations may be one way to approach the problem. These restrictions would only account for future restaurant construction, however, and would do little to reduce the high number of fast food restaurants already in these communities. Conversely, such regulations would offer opportunities for healthier food retailers and restaurants to establish a new presence in the built environment. Land use initiatives such as these represent an important first step in acknowledging that consumers' behaviors are rarely independent of their environment (Sturm & Cohen, 2009).

6.2. Consumer health and social marketing initiatives

New approaches to social marketing that focus specifically on the relationship between the built environment, environmental factors, and childhood obesity prevalence may also be an effective approach to promoting consumer health. Social marketing has existed for quite some time, and its uses continue to grow (Brennan & Binney, 2010; Creyer & Ross, 1997; Dann, 2010). When used effectively, social marketing is a powerful tool that can bring about behavioral change for the benefit of individuals, groups, and society as a whole (Jones, Waters, Holland, Bevins, & Iverson, 2010). However, as Wymer (2010) previously notes, the typical (short-lived) social marketing approach to obesity-related problems is to encourage individuals to exercise more or to eat more fruits and vegetables. Traditional social marketing messages such as these may quickly be dismissed in more urban and poorer communities though, as the realities of accessing and paying for more healthy foods or exercise facilities are realized. Therefore, the built environment plays an important, but often overlooked, role in the practicality and effectiveness of potential solutions to the childhood obesity epidemic.

The extent of this oversight is underscored by recent research which demonstrates that the efficacy of behavioral childhood obesity programs can be improved by customizing treatments according to built environment characteristics (Epstein et al., 2012). Further, traditional social marketing efforts have also generally failed to focus on awareness and education about environmental factors, such as increased fast food accessibility, that may contribute to obesity in the first place. By creating awareness of the possible causes of obesity, social marketers may be able empower consumers with both the knowledge and autonomy to generate their own customized solutions that may prove more effective in facilitating personal change. This approach may provide meaningful

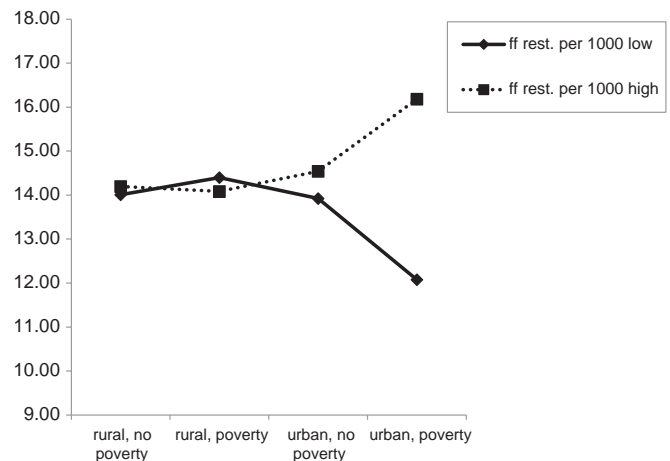


Fig. 2. Three-way interaction: the joint effect of fast food accessibility, urbanization, and poverty on preschool childhood obesity prevalence.

rationale for existing and future obesity-related social marketing campaigns, and consequently increase internalization and compliance among targeted recipients (see Moller, Ryan, & Deci, 2006).

The present findings suggest that opportunities exist for social marketers to focus more heavily on community-specific environmental factors and their relationship with childhood obesity. More specifically, social marketing approaches that may be effective when convenient access to unhealthy fast food is high include: 1) social marketing efforts that specifically target parents of pre-school children in more urban, poorer areas, and 2) social marketing efforts that specifically focus on educating parents about potentially detrimental environmental factors specific to their communities, such as increased fast food availability, as opposed to traditional messages focused on individual behaviors. Each proposal is discussed in more detail below.

#### 6.2.1. Social marketing targeting parents of pre-school aged children

Though some fast food firms devote substantial resources to advertising efforts that appeal to children, it should be noted that some large firms such as McDonald's are deemphasizing their focus on children. Further, very young children do not directly purchase fast food for themselves; rather parents (or guardians) purchase it on their behalf since young children lack the cognitive and financial resources typically displayed by older children, adolescents, and teens that facilitate more independent consumption decisions. Thus, parental behavior often plays a key factor in the development of childhood obesity (Yu, 2011); parents can choose to actively promote healthier food consumption or passively allow or promote unhealthy food consumption (Golan & Crow, 2004). Therefore, social marketing initiatives aimed at the parents of pre-school children in more urban and poor communities would likely reach those most capable of making positive changes in children's diets.

Parents can also indirectly influence their children's health through their own eating behaviors (Grier et al., 2007). Children whose parents consume more fruits and vegetables tend to do the same (Nicklas et al., 2001). In contrast, children with obese mothers have significantly elevated risks of obesity and, in turn, a greater likelihood of becoming obese adults (Strauss & Knight, 1999). Thus, parents can make healthier, more informed consumption decisions for themselves, and potentially indirectly enhance the health of their children in the process. Lastly, adults are considerably better evaluators of marketplace persuasion cues than children, and typically socially diffuse common knowledge about such persuasion to the next generation (Wright, Friestad, & Boush, 2005), giving further support to the notion that they are the most appropriate audience for social marketing initiatives concerning the built environment around them.

#### 6.2.2. Social marketing focusing on the negative influence of fast food accessibility

The extent to which childhood obesity is associated with the built environment is thought to have considerable influence on the success of community-level interventions (Salois, 2012). Therefore, instead of merely offering the typical messages about the positive or negative consequences associated with individual health behaviors (e.g., Eat healthier!), social marketers should focus on the unique relationship between consumers' health, their socioeconomic environments (e.g., urbanization and poverty levels), and their built environments (e.g., fast food accessibility). While many parents know that fast food consumption may harm their child's health (as well as their own), the vast majority of poor, urban parents are unlikely to realize the degree to which they are exposed to higher levels of fast food accessibility. They are also unlikely to be aware of the negative influence of the external food environment. For example, prior research on other products that are potentially harmful at both the individual and societal level, such as cigarettes, shows that areas which have relatively higher levels of cigarette retail outlets and advertisements are often characterized by poor consumer health due to smoking (Hackbarth, Silvestri, & Cosper, 1995).

Thus, opportunities exist for social marketers to directly communicate the possible negative effects of increased fast food accessibility, rather than just the consumption of such foods, to affected consumer segments. Such an approach would provide several advantages over other traditional approaches because it both creates awareness and provides education. Increased awareness may allow consumers to be more cognizant of the myriad of unhealthy fast food cues to which they are constantly exposed, as well as their responses to such cues. This approach would also educate parents about the potentially negative health consequences of such exposure for themselves, their children, and their families. This strategy offers autonomy for parents in terms of how the information can be incorporated into their decision-making processes. For example, parents may consciously limit their family's fast food consumption after processing information about how their unique day-to-day food environments might negatively influence their child's health. Alternatively, parents could intentionally increase their family's consumption of healthier foods, such as fruits and vegetables, in response to their enhanced awareness of the particularly unhealthy food environment around them. The basic psychological need for autonomy is a critical determinant of self-regulation efficacy and, consequently, the efficacy of related social marketing and public policy initiatives as well (Moller et al., 2006).

## 7. Conclusion and limitations

Childhood obesity more than tripled over the past generation (CDC, 2012). Yet to date surprisingly little attention has been paid to preschool aged children in the obesity prevention literature (Kuhl, Clifford, & Stark, 2012). Further, the conceptualization of the obesity epidemic has focused much more on individual choice than on environmental factors (Sturm & Cohen, 2009). However, recent research demonstrates that built environments impact the efficacy of childhood obesity treatments (Epstein et al., 2012). Consequently, this research focused on the relationship between pre-school childhood obesity prevalence, a built environment factor (fast food accessibility), and two socioeconomic factors (urbanization and poverty levels). The present findings offer insight about factors associated with childhood obesity prevalence by suggesting that increased fast food accessibility may contribute to preschool childhood obesity in more urban and poor populations. Findings demonstrate how environmental factors, such as poverty and urbanization levels, can amplify the potentially negative health effects associated with built environment factors such as fast food availability. Thus, the present research suggests that the built environment, other environmental factors, and their interaction need to be more fully considered by social marketers, policy makers, health officials, and researchers when generating possible strategies to help address obesity problems.

While the results of the present research contribute to a better understanding of an important children's health and welfare issue, several important limitations should be noted. As mentioned earlier, the interactive effects of poverty, locale, and fast food restaurant concentration on preschool childhood obesity rates are stronger than the associated direct effects (though these interaction effects appear smaller than most of the control variables previously linked to obesity rates). This finding, coupled with the limited amount of variance explained, highlights the importance of taking a holistic approach in future research on preschool childhood obesity with a particular focus on additional higher order interactions that may incrementally contribute to our limited knowledge about this societal issue.

Environmental and socioeconomic variables not tested here such as fast food pricing, frequency of eating at home with parents, actual distance from home to restaurant, or other built environment factors may interact to potentially influence childhood obesity rates. For example, would the proliferation of healthier restaurants in a given area or access to exercise facilities attenuate the effects of the interactions addressed in this research? The absence of other variables

possibly associated with childhood obesity such as the percentage of households with two biological parents, other two parent households, and single parent households could also potentially be related to preschool obesity rates and warrant future research. In addition, prior research indicates that children who consume school lunches as part of the federal National School Lunch Program are more likely to be obese than those who bring their own lunches from home, despite the fact that they enter kindergarten with the same obesity rates (Schanzenbach, 2009). Moreover, children may be more likely to be obese if they are eligible for school lunch price reductions based on their family income level (Schanzenbach, 2009). Thus, participation in school lunch programs – and other food-related programs such as food stamp programs – could potentially have positive associations with childhood obesity similar to those of fast food restaurant concentration. These possible relationships clearly warrant future research.

This research also does not consider the possible relationships for a number of individual-level psychological or perceptual variables. Thus, significant opportunities exist for subsequent research on the interactions between the myriad of environmental, social, psychological, and demographic variables associated with childhood obesity (Howlett, Burton, Newman, & Faupel, 2012). For instance, how does the perceived convenience of fast food accessibility, when coupled with more objective convenience measures, relate to childhood obesity prevalence in lower income and urban communities? Incorporation of such measures into analyses would provide a richer and more holistic perspective on the childhood obesity problem. Further, while the use of cross-sectional data is common in obesity research (Ding & Gebel, 2012; Salois, 2012), specific causal conclusions should not be inferred in cross-sectional studies. Lastly, future research should examine the potential benefits of fast food restaurant concentration, such as job growth and increased opportunities for local franchisees, to more fully understand the effects of fast food restaurants on vulnerable populations.

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