



School food environment: Quality and advertisement frequency of child-oriented packaged products within walking distance of public schools

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ABSTRACT

Food marketing for children is a major concern for public health nutrition and many schools make efforts to increase healthy eating. Food environments surrounding schools in urban areas may undermine these efforts for healthy nutrition within school programs. Our study aim is to describe the nutrition environment within walking distance of schools in terms of food quality and food marketing and to explore the degree to which elements of the nutrition environment varies by proximity to schools. In a cross-sectional study, we analyzed the surrounding food environments of a convenience sample of 46 target schools within 950m walking distance in 7 different urban districts across Vienna, Austria. In total, we analyzed data from 67 fast food outlets and 54 supermarkets analyzing a total of 43,129 packaged snack food and beverage products, from which 85% were for adults and 15% of the products were child-oriented. Proximity to the schools did not affect the availability of child-oriented products and dedicated food advertisements for children. After applying nutrient profiling using the Nutrient Profiling Model (NPM) on child-oriented products, results showed that 15.8% of the packaged snack food were categorized as “healthy” foods and 84.2% as “less healthy”; for beverages 65.7% were categorized as “healthy” and 34.3% as “less healthy”. In conclusion, our results show that child-oriented snacks are not more frequently advertised around schools but substantially lack in nutritional quality with the potential to undermine efforts for promoting healthy eating practices within schools.

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1. Introduction

Schools are potential targets for public health nutrition interventions to improve children's eating behavior (Lowe et al., 2004; Upton et al., 2015). These measures are important in the face of persistently high levels of childhood obesity (Ogden et al., 2014). However, schools' efforts to improve eating behavior may be limited to the extent of co-evolved contextual factors. For instance, built food environments surrounding public schools might contribute to the broader concept of “obesogenic environments” (Swinburn et al., 1999). Children spend a vast amount of time inside as well as around schools, and when having the chance as well as the money, they act as potent customers with high purchasing power (Nestle, 2013). Research consistently showed that advertised foods on TV are in stark contrast to national dietary recommendations (Keller and Schulz, 2011; Missbach et al., 2015) and more general, marketing practices targeted at children mainly promote foods and beverages with low nutritive values (Cairns et al., 2013). In light of this “crisis in the marketplace” (Harris et al., 2009), analyzing the immediate school food environments is indicated as a pivotal area for research in public health nutrition.

1.1. Background

Food marketers have long recognized children as potential targets for marketing and advertisement which is shown in increased industry spending targeting children (Galbraith-Emami and Lobstein, 2013). The availability of energy-dense and nutrient poor (EDNP) foods and the presence of child-oriented marketing substantially influence children's food choices increasing the likelihood for childhood obesity (Harris et al., 2009; Brownell and Gold, 2012). Arguably the built school food environment may undermine potential efforts made within school programs to improve healthy eating (Walton et al., 2009). Recent research suggests, that convenience store availability within walking distance to public schools notably increases BMIz scores of schoolchildren by 0.004 units per additional available store (95% CI: 0.001, 0.007) (Baek et al., 2016a). BMIz scores measure the relative weight adjusted for both child age and sex and are therefore a useful measure for body weight. In addition, recent research showed that convenience store availability within 1 mile (1.6 km) was associated with higher BMIz independently of schoolchildren characteristics (sex, ethnicity and study success) (Baek et al., 2016b).

Supermarkets and food outlets can serve as primary food suppliers for schoolchildren in schools without school food programs. Even when school lunch is offered within schools, students still buy local

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snacks that are within walking distance during school breaks, on their way to school or on the way back home from school. In an observational study analyzing 833 intercept surveys in corner stores within walking distance of 10 schools, Borradaile et al. showed that urban elementary schoolchildren were most likely to purchase EDNP products (chips, candy, sugar-sweetened drinks) (Borradaile et al., 2009). Indeed, snacking constitutes to around 27% of children's daily caloric intake and an increase in snacking habits over the past several decades has been observed (Piernas and Popkin, 2010). Epidemiological studies have shown that snacking pattern and especially snack quality substantially contributes to overweight and obesity outcomes (O'Connor et al., 2015; Njike et al., 2016).

Addressing the school food environment is not a straightforward task. We argue that not only walking distance and the mere availability of supermarkets and food outlets, but also the quality and quantity of accessible food products are relevant predictors for children's purchasing (and consumption) behavior. Proximity, brand loyalty and marketing techniques should be considered as well because these factors bias food consumption in children (Chandon and Wansink, 2012). A systematic review of 11 studies showed that familiar media character branding influence children's food preferences, choices and intake (Kraak and Story, 2015). This can be problematic when advertised foods are mainly EDNP (candy, cookies or chocolate) and not desirable "healthy" foods (fruits, vegetables). Ebster, Wagner & Neumueller found that in supermarkets, children are more driven towards food items that are easy to consume (candy) or are more likely to purchase foods if other promotional giveaways are present (toys) (Ebster et al., 2009).

Previous studies showed that child-oriented marketing is available within short walking distance to public schools in low and middle-income countries (Kelly et al., 2015). For instance, Chacon et al. demonstrated that within a 200 m radius from two pre-schools and two primary schools in Guatemala, most advertised child-oriented food products were for sweetened beverages and soft drinks (Chacon et al., 2015). From all advertisements 1/3 of the snack advertisements were targeted at children and advertised products were available within short walking distance (<170 m). Some data collected from western countries also suggest frequent food advertisement around schools (Walton et al., 2009; Gebauer and Laska, 2011; Kelly et al., 2008; Maher et al., 2005), however to date there is no comprehensive research within large parts of urban environments of one major European city investigating both food quality and marketing techniques. Especially for urban environments, a decisive approach that analyzes food advertisement, food quality and in-store product presentation within school walking distance is missing in the literature. A key question here is: what food environments do schoolchildren find when stepping out of their school buildings and what are the main features in terms of food product quality and food marketing?

1.2. Study aims

In light of aforementioned aspects, the aims of this exploratory study are twofold and within the scope to improve our understanding of the built food environments around public schools in urban spaces. First, we collect data about exterior (outside) and interior (inside) child-oriented food advertisement strategies in supermarkets and fast food outlets in the urban region of Vienna, Austria. In a second step, we analyze the quality (healthfulness), quantity (frequency) and in-store presentation of packaged snack products and beverages within walking distance.

2. 2. Methods

We conducted an exploratory cross-sectional field study in three consecutive months during fall semester of a regular school year (September–December 2015). In a first step, we systematically identified target schools ($n = 46$) and constructed a checklist to assess data from all available packaged snack food products. After data assessment,

in a final step, we coded the food data according to the Nutrient Profiling Model (NPM) criteria to classify foods and beverages as "healthy" or "less healthy" (Department of Health, 2011). In this study no human subjects were involved as we only looked at the food environment and not actual behavior of the schoolchildren. This study was conducted in line with the principles of the Declaration of Helsinki regarding data management and ethics of conduction.

2.1. Sample sites

We included public schools with different educational levels (elementary schools, primary schools, schools with technical focus) comprising a total of 46 schools in 7 different urban districts across Vienna (Landstraße, Josefstadt, Favoriten, Hietzing, Ottakring, Floridsdorf, Donaustadt). Target schools were schools with schoolchildren age 6–14 (excluding Kindergarten). Together, the immediate school food environments cover a total area of 1.8 km (Upton et al., 2015) (Fig. 1). To get a fairly heterogeneous sample, we chose districts representing areas with substantially varying socioeconomic background (identified by GDP per capita in €). For instance, we included districts below the mean average income (Ottakring) and districts above the mean average income (Hietzing). We analyzed the immediate school food environment that is accessible for schoolchildren. We defined the maximum walking distance as the distance that can be covered by an average schoolchildren within 20 min of walking (max. 950 m = 0.6 miles radius). In Vienna, there are currently 696 schools. The analyzed areas covered 56.6% of all Viennese schools.

2.2. Data collection and target foods

For data collection, we conducted on-site visits by exploring the dedicated areas by foot, using mobile phones to track geo-locations. We analyzed both fast food outlets and supermarkets assessing all available child-oriented packaged snack foods and beverages. We identified child-oriented products according to a dichotomous categorization scheme adapted from Chapman et al. (see Supplementary material for coding scheme; S1) (Chapman et al., 2006) and counted the number of available items. For both target sites, we assessed general information (name of the target site, exact geo-location and the date of the survey); followed by items about the food advertisements around/inside/outside the supermarket or fast food outlet. In detail, we recorded the availability and how food advertisements were presented (posters, stickers, board advertisements or illuminated advertisements).

For food and beverage categorization, we divided this checklist into 8 different product categories and their subcategories. Product categories were defined according to the EU Pledge Nutrition Criteria White Paper for advertisement on TV, print, and internet in the European Union (EU Pledge Nutrition Criteria). The EU Pledge Nutrition Criteria does not allow advertising sugary-based products (chocolate, candy bars, box of chocolates, gummy bears, candies and chewing gum) and non-alcoholic beverages in the form of sodas, this is why we added these categories. Following categories were identified:

- Category 1: Fruits, vegetables and nuts (apple, cucumber, dried apricots, trail mix);
- Category 2: Dairy products (vanilla milk, strawberry yogurt, whey drink, chocolate pudding);
- Category 3: Cereal-based products (waffles, chocolate croissant, cereal bar, cornflakes);
- Category 4: Sweets and candies (chocolate bar, gummi bear, chewing gum, drops);
- Category 5: Ready-to-eat ice-cream;
- Category 6: Ready-to-eat meat-based products (salami sticks);
- Category 7: Ready-to-eat meals (sandwich, salad); and
- Category 8: Non-alcoholic beverages (water, fruit juice, soft drink, energy drink, sport drink).

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