



## Impact of front-of-pack nutrition information and label design on children's choice of two snack foods: Comparison of warnings and the traffic-light system



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### ABSTRACT

Research on the relative influence of package features on children's perception of food products is still necessary to aid policy design and development. The aim of the present work was to evaluate the relative influence of two front-of-pack (FOP) nutrition labelling schemes, the traffic light system and Chilean warning system, and label design on children's choice of two popular snack foods in Uruguay, wafer cookies and orange juice. A total of 442 children in grades 4 to 6 from 12 primary schools in Montevideo (Uruguay) participated in the study. They were asked to complete a choice-conjoint task with wafer cookies and orange juice labels, varying in label design and the inclusion of FOP nutrition information. Half of the children completed the task with labels featuring the traffic-light system ( $n = 217$ ) and the other half with labels featuring the Chilean warning system ( $n = 225$ ). Children's choices of wafer cookies and juice labels was significantly influenced by both label design and FOP nutritional labels. The relative impact of FOP nutritional labelling on children's choices was higher for the warning system compared to the traffic-light system. Results from the present work stress the need to regulate the design of packages and the inclusion of nutrient claims, and provide preliminary evidence of the potential of warnings to discourage children's choice of unhealthful products.

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### 1. Introduction

Changes in the global food system have been identified as key drivers of the increase in childhood overweight and obesity, which have become one of the most important public health problems worldwide (Rivera et al., 2014; Swinburn et al., 2011). Since the late 1980s the global food system has developed business and marketing strategies to encourage people to consume highly processed, commodity-derived products with high calorie, fat and sugar content (Hawkes, 2012; Ludwig & Nestle, 2008). However, for

decades, approaches to tackle obesity have failed to recognize the influence of the food system and the environment in shaping food preferences and undermining children and parents' capacity of making informed choices (Roberto, Pomeranz, & Fisher, 2014). For this reason, public policies aimed at addressing the global children obesity epidemic need to modify the food environment to overcome barriers to healthy eating and promote consumption of healthful products (Hawkes et al., 2015).

Child-oriented food products are widespread in the marketplace within a broad range of categories and represent an important commercial revenue for food companies (Letona, 2015; Schor, 2004). Several marketing techniques are used to target products at children, including advertising, sponsorship, promotions, merchandising and packaging (Elliot, 2009; Hawkes, 2010; Institute of Medicine, 2006). Studies conducted in different countries around

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the globe have shown that most of these products contain excessive amounts of sugar, fat and/or sodium (Chacon, Letona, & Barnoya, 2013; Elliot, 2007; Giménez, de Saldamando, Curutchet, & Ares, 2016; Harris, Schwartz, & Brownell, 2010; Hawkes, 2010; Hebden, King, Kelly, Chapman, & Innes-Hughes, 2011). Restrictions on marketing strategies of foods targeted at children have been implemented in different countries but only to a limited extent and not very comprehensively (Cairns, Angus, & Hastings, & Caraher, 2013; Hawkes, 2010; Letona, 2015; World Health Organization, 2012). In particular, regulations usually overlook the importance of packaging as a key marketing strategy (Cairns, Angus, Hastings, & Caraher, 2013).

Food packages targeted at children are usually designed using bright colours, cartoon characters, references to fun, sport and play, photos of celebrities, and tie-ins with movies or TV programs (Chacon et al., 2013; Giménez et al., 2016; Hawkes, 2010; Hebden et al., 2011). In addition, references to nutrients and nutrition claims are usually included, even if products contain high sugar, fat and/or salt content (Giménez et al., 2016; Sims, Mikkelsen, Gibson, & Warming, 2011). These strategies encourage children to think products are tasty, healthful, more fun and more appropriate for them, increasing their liking and willingness to consume (Ares et al., 2016; Arrúa et al., 2017; Elliot, 2009; Lapierre, Vaala, & Linebarger, 2011; Letona, 2015; Letona, Chacon, Roberto, & Barnoya, 2014; Levin & Levin, 2010). Given the impact of package design on children's perception of food products, its regulation has been identified as one of the possible strategies to discourage consumption of unhealthy products (World Health Organization, 2012). Although focus has been usually placed on the inclusion of cartoon characters, other package features could also influence children perception of food products (Elliot, 2009; Lobstein, 2013; Ministerio de Salud, 2015a). For this reason, research is still necessary to aid policy design and development (Elliot, 2009; Lobstein, 2013).

Another strategy that can be used for promoting healthful food choices among children is increasing their nutritional knowledge and equipping them with the necessary skills to distinguish healthful from unhealthy products (Tarabashkina, Quester, & Crouch, 2016). However, children have been reported to need nutritional information confusing and to base their healthfulness judgements on visual cues of packages, such as colours or the presence of fruit images (Elliot, 2009; Neeley & Petricone, 2006). For this reason, simple front-of-pack (FOP) nutrition labelling schemes may have the potential to influence children's perception and discourage consumption of unhealthy products. Although this strategy has been extensively studied with adults in the last decade, its influence on children's perception has not received much attention yet (Hawley et al., 2013).

The traffic-light system is a semi-directive nutrition labelling scheme that communicates information about the content of key nutrients and indicates whether they are considered as low, medium or high, using text descriptors and colour code (Food Standards Agency, 2007). This scheme has been reported to be one of the most efficient to improve adult consumers understanding of nutrition information (Hawley et al., 2013). Ellis and Ellis (2007) reported that the use of a school traffic light nutrition tool decreased frequency of asking for foods associated with red colour. However, studies have shown that the inclusion of the traffic-light system on food labels or fast food menus does not significantly influence children's food choices (Ares et al., 2016; Dodds et al., 2014).

Considering that children may find it difficult to evaluate product healthfulness based on the content of several nutrients (Neeley & Petricone, 2006), directive FOP labels could be a more efficient tool to modify their healthfulness perception and modify

their food choices. Directive FOP nutrition labels highlight products that meet specific nutritional criteria to be considered healthful (health logos) or unhealthy (warnings). Elliot (2009) reported that children considered health logos for making healthfulness judgements of packaged food products. In addition, Privitera, Phillips, Zuraikat, and Paque (2015) evaluated the use of emoticons, which use emoticons to convey product healthfulness, and reported that their inclusion led to healthful food choices in school-aged children.

Warnings highlighting high content of key nutrients have been recently implemented in Chile to discourage consumption of unhealthy products (Corvalán, Reyes, Garmendia, & Uauy, 2013; Ministerio de Salud Pública, 2015b). In this system, products with high content of key nutrients (calorie, sodium, sugar and saturated fat) should include separate black octagonal signs for each nutrient on their front of pack. Even though this system has the potential to easily convey information of unhealthy associations to children, their influence on their food choices has not been studied yet.

Snacks are among the first and most frequent in-store requests of children to their parents and are heavily marketed (Story & French, 2004). These products have become a major contributor to calorie and saturated fat intake, mainly because many industrialized snack products available in the marketplace are energy-dense and high in saturated fat and/or sugar (Gregori, Foltran, Ghidina, & Berchiolla, 2011). Therefore, given that snacking is a frequent eating habit for children (Piernas & Popkin, 2010), strategies to discourage consumption of unhealthy snack products could contribute to cope with childhood obesity.

The aim of the present work was to evaluate the relative influence of two front-of-pack nutrition labelling schemes, the traffic light system and Chilean warning system, and the label design on children's choice of snack products.

### 1.1. Overview of the present study

In the present work, the influence of label design and FOP nutrition labelling was evaluated on two different snack foods to enable generalizability of the findings: one solid food (waffle cookies) and one drink (orange juice). Selection of snack products was based on their popularity among school-aged children in Montevideo (Uruguay), determined in a previous study in which a total of 1085 children (aged between 6 and 12 years old) from different schools had to indicate the snack they liked the most.

For each product, labels were designed using three 2-level variables, including two characteristics of label design and FOP nutrition label. The selection of the label design variables included cartoon characters (familiar and unfamiliar), which have been identified as the most common strategy used by food companies to target food products at children (Castonguay, Kunkel, Wright, & Duff, 2013; Hebden et al., 2011; Letona, 2015). Two additional variables which have not received much attention in the literature were also included in the study. In the case of orange juice, the addition of vitamin C was considered due to the frequent inclusion of nutrition claims on the drinks targeted at children available in the Uruguayan marketplace (Giménez et al., 2016). In the case of wafer cookies, the inclusion of a fruit drawing was considered due to its frequent use in fruit products to convey positive health and hedonic associations (Sütterlin & Siegrist, 2015), particularly in this product category.

For each product, the influence of the three variables on children's choices was evaluated in a between-subjects design using choice-based conjoint analysis. In this methodology, participants are presented with sets of products that systematically vary in specific attributes and are asked to select their preferred product (Green & Srinivasan, 1990). The application of mathematical

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