Children and adolescents' attitudes towards sugar reduction in dairy products

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ABSTRACT

The development of strategies to reduce sugar intake of children and adolescents has been deemed necessary to cope with the global obesity epidemic. In this context, the aims of the present work were to study attitudes towards sugar reduction in three dairy products of children and adolescents of two income levels and to assess if these attitudes were modulated by the inclusion of the traffic light system on labels. A total of 646 children and adolescents from three primary/secondary schools in Montevideo (Uruguay) participated in the study. A total of twelve labels were designed following a full factorial design with three variables: dairy product (3 levels: yogurt, chocolate-flavoured milk and vanilla milk dessert), sugar reduction claim (2 levels: absent and present "20% less sugar") and traffic light system (2 levels: absent and present). Children had to evaluate their expected liking of the labels and to answer a check-all-that-apply question composed of terms related to tastiness, healthfulness and fun. Sugar claim significantly increased children and adolescents' expected liking scores ($p = 0.01$), suggesting they had a positive attitude towards sugar reduction in the evaluated dairy products. However, the influence of sugar reduction claim on hedonic expectations and healthfulness perception was modulated by the inclusion of the traffic-light system on labels ($p = 0.01$). This front-of-pack nutrition labelling scheme increased their unhealthfulness perception of products with high sugar content and could potentially discourage their consumption. Age and income modulated the influence of these strategies on hedonic and healthfulness perception ($p < 0.05$).

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1. Introduction

Overweight and obesity in children and adolescents have dramatically increased in the last three decades and have become a major public health problem in both developed and developing countries (Ng et al., 2014). In the specific case of Uruguay, the latest available estimations have reported that approximately 27% of the children and adolescents aged between 9 and 15 years old are overweight or obese (Pisabarro, Recalde, Irrazábal, & Caftare, 2002; MInisterio de Salud Pública, 2016). Although obesity is determined by the interaction of complex genetic, environmental, cultural socioeconomic and behavioural factors, increased energy intake has been identified as a key contributor to the global growth in obesity prevalence (Prentice & Jebb, 2004; Swinburn et al., 2011).

Sugar and dietary fat are associated with overconsumption of energy and have been identified as the main dietary determinants of obesity (Ambrosini, Johns, Northstone, Emmett, & Jebb, 2016; Malhotra, 2013). In particular, sugar added to food is a major source of calories with no additional nutritional value and has been linked to several metabolic abnormalities and adverse health problems, such as type 2 diabetes and cardiovascular diseases (Lustig, Schmidt, & Brindis, 2012; Vio & Uauy, 2007; Te Morenga, Mallard, & Mann, 2013).

Processed products targeted at children often contain excessive added sugar content (Chapman, Nicholas, Banovic, & Supramaniam, 2006; Elliot, 2007; Ferreira, da Silva, de Moraes, & Tancredi, 2015; Giménez, de Saldamando, Curutchet, & Ares, 2017). Sugar sweetened beverages, bread and cereals, confectionery, dairy products and fruit products have been identified as the main sources of sugar intake among children and adolescents (Louie, Moshtaghlan, Rangan, Flood, & Gill, 2016; Pawellek et al., 2017). Although targeting sugar-sweetened beverages has been often regarded as a key action to cope with the obesity (Malik, Pan, Willett, & Hu, 2013), the importance of other product categories has been usually underestimated. In this sense, sweetened dairy products deserve special attention. These products have a positive healthy image and are usually regarded as an

important food category for the development of children and adolescents, being frequently consumed by this target group (Gopinath et al., 2014; Green, Turner, Stevenson, & Rumbold, 2015).

Different strategies can be implemented to reduce children and adolescents' sugar intake. Reducing the added sugar content of processed products has been claimed to be one of the most cost-effective strategies to rapidly reduce sugar intake (MacGregor & Hashem, 2014). The main challenge for reducing the sugar content in processed products is related to changes in product flavour and texture, which are determinant of product success in the marketplace (van Raaij, Hendriksen, & Verhagen, 2009). This is particularly relevant in the case of children due to their heightened preference for sweet taste (Ventura & Menella, 2011). In addition to the formulation challenges of sugar reduction, one of the key issues is whether sugar reduction should be communicated or not. In this sense, an in-depth understanding of children and adolescents' attitudes towards sugar reduction is needed.

Another strategy that can be used for reducing sugar intake is equipping children and adolescents with the skills to identify products with high sugar content (Tarabashkina, Quester, & Crouch, 2016). However, children and adolescents need accessible, simple and understandable nutrition information on packages to assist them in making their food choices (World Health Organization, 2016). Different formats of front-of-package nutrition information have been developed the last decade (Hodgkins et al., 2012). In particular, the traffic-light system classifies the content of key nutrients as low, medium or high, using text descriptors and a colour code (Food Standards Agency, 2007). The inclusion of the traffic-light system on products with high sugar content can potentially discourage their consumption. Although this scheme has not been included in Uruguay yet, it has been reported to be one of the most efficient to improve understanding encourage more healthful choices among adult consumers (Hawley et al., 2013). However, research with children and adolescents is still limited and contradictory results have been published. Ellis and Ellis (2007) reported that the traffic-light scheme decreased frequency of asking for foods associated with red colour. However, its inclusion on food labels or fast food menus has not been shown to positively influence children's food choices (Ares et al., 2016; Arrúa et al., 2017; Dodds et al., 2014).

Food choice cannot be fully understood without the consideration of individual characteristics (Köster & Mojet, 2006). Income is one of the main socio-demographic variables that influence how people perceive and choose foods (Hough & Sosa, 2015). Food consumption can be regarded as an expression of social status and identity and, therefore, shapes the meanings attached to different products (Tivadar & Luthar, 2005). Differences in the food choices and eating patterns of low and middle/high income children have been reported by several authors (e.g. Dubois, 2006; Evans, Wells, & Schamberg, 2010). In addition, Arrúa et al. (2017) has recently shown that low-income children had a more positive perception of snack food labels than middle and high income children.

In this context, the aims of the present work were to study attitudes towards sugar reduction in three dairy products (chocolate-flavoured milk, milk desserts and yogurt) of children and adolescents of two income levels and to assess if these attitudes were modulated by the inclusion of the traffic light system on labels.

2. Materials and methods

2.1. Participants

A total of 646 children and adolescents from three primary/secondary schools in Montevideo (Uruguay) participated in the study, which was conducted between September and December 2015. The schools were located in different neighbourhoods in Montevideo and represented two different socio-economic levels: low/middle-low, and high income (Intendencia de Montevideo, 2011). Participants' socioeconomic level was estimated considering the socio-economic of the

neighbourhoods in which the schools were located. Table 1 shows an overview of the children's distribution in terms of gender, age and income. No compensation was given to participants. The experimental protocol was approved by the Ethics Committee of the School of Chemistry of Universidad de la República (Uruguay). Written informed consent from parents and children/adolescents was obtained prior to the study.

2.2. Experimental design

Rating-based conjoint analysis was used to evaluate children and adolescents' attitudes towards sugar reduction in dairy products. A total of twelve labels were designed following a full factorial design with three variables: dairy product (3 levels: yogurt, chocolate-flavoured milk and vanilla milk dessert), sugar reduction claim (2 levels: absent and present "20% less sugar") and traffic light system (2 levels: absent and present). Labels were designed including all compulsory information required by Uruguayan legislation and did not correspond to commercial products available in the marketplace. The nutritional information included on the labels corresponded to the composition of similar commercial products. The sugar content of regular products was highlighted as high using the text descriptor and red colour, whereas sugar-reduced labels contained medium sugar content (highlighted in yellow) (Food Standards Agency, 2007). Fig. 1 shows two examples of the labels used in the study.

2.3. Experimental procedure

The study was carried out in the children and adolescents' classroom and was self-administered, following the instructions provided by a researcher. Participants received the twelve labels one by one, following a Williams' Latin Square experimental design. For each of the labels they were asked to indicate how much they would like the product, using a 7-box hedonic scale (1 = I don't like it at all, 7 = I love it). The hedonic scale had a sad face on the left and a smiley face on the right for children (7–12 years old) and a thumbs down sign on the left and a thumbs up sign on the right for adolescents (13–17 years old). The application of facial references in hedonic scales has been extensively reported in studies with children to improve understanding (Laureati, Pagliarini, Toschi, & Monteleone, 2015). In the present work, given the popularity of Facebook among adolescents, facial references were replaced by thumbs up and thumbs down sign in the scales of the 13–17 years old group.

Participants also had to answer a simple check-all-that-apply (CATA) question comprised of six terms: yummy, yucky, good for my health, bad for my health, funny, and boring. Although the number of terms included in CATA questions with adult participants is usually higher (Ares & Jaeger, 2015), in the present work only a limited number of terms was used to facilitate children's task, particularly given that they had to evaluate 12 labels. The terms included in the CATA question were selected by the authors to cover three different aspects of product perception that play a relevant role in the eating habits of this population: pleasure, healthfulness and associations with fun (Brierley &

Table 1
Sociodemographic characteristics of the participants involved in the study (n = 646).

Characteristic	Number of participants	Percentage of the total (%)
Gender		
Boys	360	56%
Girls	286	44%
Age (years old)		
7–12	321	50%
13–17	325	50%
Income		
High	288	45%
Low/Middle-low	358	55%