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Research report

Associations between home- and family-related factors and fruit juice and soft drink intake among 10- to 12-year old children. The ENERGY project ☆

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ABSTRACT

The aim of this study is to investigate associations of family-related factors with children's fruit drink/juice and soft drink consumption. A cross-sectional survey among 10- to 12-year-old children and their parents in eight European countries was conducted to gather this data. Key variables of interest were children's self-reported fruit drink/juice and soft drink intake per day (outcome) and family-related factors (based on parents' report) related to these two behaviors (modeling, automaticity, availability, monitoring, permissiveness, negotiating, communicating health beliefs, avoid negative modeling, self-efficacy, rewarding, and family consumption). 7915 Children (52% girls; mean age = 11.7 ± 0.8 years) and 6512 parents (83% women; mean age = 41.4 ± 5.3 years) completed the questionnaire. Multilevel regression analyses were used to examine the aforementioned associations. Three of the 11 family-related factors (modeling, availability, and family consumption) were positively associated with children's fruit drink/juice and soft drink intake. Additionally, three family-related factors (permissiveness, monitoring, and self-efficacy) were solely associated with soft drink intake and one family-related factor (communicating health beliefs) was related to fruit drink/juice intake. Future interventions targeting children's fruit drink/juice and soft drink intake should focus on the home environment, parents and their practices, especially on parents' fruit drink/juice and soft drink intake and availability of these beverages at home.

Introduction

The intake of sugar-sweetened drinks in children is high and has increased worldwide in the past decades (Gezondheidsraad, 2002; Jordbruksverke, 2005; Nielsen & Popkin, 2004; Vereecken, Inchley, Subramanian, Hublet, & Maes, 2005); mean intakes of 350 and 500 ml/day have been reported for European girls and boys, respectively (Brug et al., 2012). Next to soft drinks and other artificially sugared drinks, the intake of fruit drinks (i.e. juice drinks with less than 100% fruit juice and sometimes added with sweeteners, flavors and fortifiers) may also contribute to sugary drink intake. Several European studies indicated that current intakes of fruit drinks and 100% fruit juice amount to an average 200 and 250 g/day for girls and boys, respectively (Brug et al., 2012; Vågstrand, Linné, Karlsson, Elfhag, & Lindroos, 2009; Yngve et al., 2005).

It has been argued that the increase in intakes of sugar-sweetened drinks has contributed to the rising prevalence of overweight and obesity in children and adolescents. A recent review (Malik, Schulze, & Hu, 2006) and meta-analysis (Vartanian, Schwartz, &

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Brownell, 2007) support the association between soft drink consumption and overweight. In addition, Ludwig and colleagues (Ludwig, Peterson, & Gortmaker, 2001) reported the first study that found a positive prospective association between consumption of sugar-sweetened drinks and obesity in 11- and 12-year-olds over 19 months follow-up. Additionally, previous studies have found a positive association between sugar-sweetened beverages and energy intake among children and adolescents (Ludwig et al., 2001; Mrdjenovic & Levitsky, 2003). To date, research has mainly focused on soft drinks, however, in specific studies fruit drink consumption was also found to be associated to a higher body weight (Bes-Rastrollo, Sanchez-Villegas, & Gomez-Garcia, 2006; Sanogorski, Bell, & Swinburn, 2007). In contrast, 100% fruit juice is not related to adiposity in children unless it is consumed in excessive amounts (Davis et al., 2007).

Although the aforementioned reviews (Bes-Rastrollo, Sanchez-Villegas, & Gomez-Garcia, 2006; Ludwig et al., 2001; Malik et al., 2006; Sanogorski, Bell, & Swinburn, 2007; Vartanian et al., 2007) found evidence for a positive link between sugar-sweetened beverages and overweight/obesity, these reviews also underlined that this association is complex as the biological mechanisms for this link between sugar-sweetened beverage intake and obesity are not completely clear. Several possible explanations have been suggested, including high fructose content and displacement of calcium-containing beverages (Vågstrand et al., 2009). However, the most likely explanation is the mediating role of energy intake; e.g. that intake of sugar-sweetened drinks brings less satiation, resulting in incomplete energy compensation (i.e. these drinks do not replace energy intake from other dietary sources) and thereby causing a higher daily energy intake (Olsen & Heitmann, 2008).

Moreover, intake of sugary drinks is also found to be associated with other health problems such as dental caries (Heller, Burt, & Eklund, 2001), and possibly hyperactivity, and mental health problems (Lien, Lien, Heyerdahl, Thoresen, & Bjertness, 2006). However, whereas soft drinks are generally perceived as bad for health and weight, children and parents often perceive fruit drinks and juice to be a healthy choice (Vågstrand et al., 2009). Nevertheless, despite the presence of important nutrients (i.e. vitamins) in fruit drinks and juice, these intakes need to be limited. However, to date, few guidelines are available concerning fruit drink/juice intake. The American Academy of Pediatrics recommends maximum 1 and 2 servings of 100% fruit juice per day for young children (1–6 years) and older children (7–18 years), respectively (AAP, 2001).

Given the association between sugar-sweetened beverages and obesity and other health problems, interventions focusing on decreasing soft drink and fruit drink/juice intake may be warranted. Furthermore, considering the overestimation of the healthiness of fruit drinks/juice, more extensive research on motivations and potential determinants of excessive fruit drink/juice consumption is imperative to inform interventions aiming to reduce such intakes.

Research indicates that parents play a major role in the development of healthy eating habits of their children through mechanisms including role modeling of a healthy diet, availability and accessibility of foods at home and the development of attitudes, values and preferences (Patrick & Niklas, 2005; Story, Kaphingst, & French, 2006; Van der Horst et al., 2007a). Additionally, different (health) behavior theories (Social Cognitive Theory (Bandura, 1997), Theory of Planned Behavior (Ajzen, 1991), Theory of Reasoned Action (Fishbein & Ajzen, 1975), and Control Theory (Carver & Scheier, 1998)) state that the social environment (i.e. parents) has a major influence on children's health behaviors through mechanisms such as modeling of behavior, access or barriers to resources, reinforcement of behavior, social norms of behavior, monitoring of behavior. However, only few studies have explored some associations between specific family-related factors (i.e. modelling, availability) and children's soft drink and fruit drink/juice consumption (Van der Horst et al., 2007a; Bauer, Neumark-Sztainer, Fulkerson, Hannan, & Story, 2011; Bere, Glomnes, te Velde, & Klepp, 2007; Cullen et al., 2003; Grimm, Harnack, & Story, 2004; Vågstrand et al., 2009). However, no studies are available that examined a broader range of family-related factors and their relation with both soft drink and fruit drink/juice intake of children.

Therefore, the aim of this study was to examine associations between family-related variables and children's soft drink and fruit drink/juice intake. Data from the recent "EuropeaN Energy balance Research to prevent excessive weight Gain among Youth" (ENERGY)-study (Brug et al., 2010), in which a wide range of physical and socio-cultural family-related factors associated to children's soft drink and fruit drink/juice consumption were assessed (van Stralen et al., 2011), were used for this purpose. Since large differences were found between fruit drink/juice and soft drink intake of children in the different countries (Brug et al., 2012), we also investigated whether these associations differed by country.

Methods

Design and setting

The ENERGY-project included a school-based cross-sectional survey of overweight, obesity and energy balance-related behaviors (EBRBs) across eight European countries. The survey entailed anthropometric measurements, child questionnaires, parent questionnaires, school-staff questionnaires and school observations to measure EBRBs and potential individual and environmental correlates of these behaviors. A description of the design and conceptual framework of the ENERGY-project (Brug et al., 2010) and an extensive description of the design, procedures, and methodology of the ENERGY school-based survey (van Stralen et al., 2011) are described elsewhere. The data collection manual and survey questionnaires for the ENERGY cross-sectional survey are available online http://projectenergy.eu. Ethical approval was obtained from Medical Ethical review committees in all participating countries.

Participants

The survey was carried out between March and December 2010 in eight European countries (Belgium, Greece, Hungary, The Netherlands, Norway, Slovenia, Spain, and Switzerland) among 10- to 12-year old children. Based on previous cross-European studies (e.g. Pro Children (Klepp et al., 2005)), a minimum sample of 1000 children schoolchildren per country and one parent/caretaker for each child was aimed for. A national sample frame was used in Greece, Hungary, The Netherlands and Slovenia, while schools from specific regions were sampled in Belgium, Norway, Spain and Switzerland (van Stralen et al., 2011). Due to the differences in population distribution within the different regions, the sampling of schools was random, multi-staged, and stratified by degree of urbanization. More extensive information about the recruitment procedure can be found in van Stralen and colleagues (van Stralen et al., 2011).

A school recruitment letter was sent to the headmaster or principal of the sampled schools, followed by a personal call. Following the school's agreement, parents received a letter explaining the study purpose and were asked for written consent for their child's and own participation.

Measures

Measurements were conducted according to standardized protocols (van Stralen et al., 2011). The children completed questionnaires during school time. In addition, anthropometrical