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The school nutrition environment and its association with soft drink intakes in seven countries across Europe – the ENERGY project

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ABSTRACT

The school is an important setting for promoting healthy eating especially at the transition from childhood to adolescence. This study contributes to the literature by describing practices within physical, political and sociocultural aspects of the school nutrition environment in seven countries across Europe based on questionnaires to the school management, and exploring their associations with soft drink consumption reported on questionnaires by 10–12 year olds. Several of the commonly self-reported practices could be supportive of a healthy diet (time to eat, access to water, restriction on marketing), but some practices were underutilized (i.e. discussion with stakeholders, healthy foods at events). Only a few associations of practices with the pupils' soft drink consumption were found.

1. Introduction

The school is an important setting for promoting healthy eating and thus contributing to curbing the obesity epidemic (WHO, 2006; Story et al., 2009). The World Health Organization (WHO) states that the underlying aim of their food and nutrition policy for schools is "to ensure that the messages promoted throughout the school system are consistent and mutually reinforcing" (WHO, 2006). This emphasizes that the school nutrition environment is more than just classroom-based nutrition education. Recent reviews have provided some evidence for the importance of nutrition guidelines (Jaime and Lock, 2009) and environmental changes (van Cauwenberghe et al., 2010) in school-based nutrition interventions. Yet, research on school nutrition environment seems to have mainly focused on food availability and policies (Masse and de Niet, 2013; Nathan et al., 2013), and mostly with a lack of emphasis on theoretical rational, as well as reliability and validity testing of the constructs (Lytle, 2009a). The ANGELO-framework (ANalysis Grid for Environments Linked to Obesity) was developed as a tool to map environmental influences that drive the obesity epidemic (Swinburn et al., 1999). The framework recognizes four types of environment: physical (what is available?), economic (what is affordable?), political (what are the policies, rules and regulations?) and sociocultural (what is socially appropriate, acceptable and supported?). Although the framework primarily is developed as a tool for the needs assessment and problem identification phase of planning obesity prevention interventions (Swinburn et al., 1999), it has also been applied to describe the school food environment (Carter and Swinburn,

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2004). There is a well-known North–South divide in overweight prevalence among children and adolescents in Europe (Lien et al., 2010; Brug et al., 2012a) The Northern/Central countries have lower prevalences of 13–23% overweight (including obese), whereas the Southern countries and the UK have higher prevalences of 20–40% overweight (including obese) among adolescents. Given these large differences in overweight and obesity prevalence as well as nutrition behaviours in school children across Europe (Brug et al., 2012a), there is a clear lack of cross-national data describing a range of factors of the European school nutrition environments which might help understand some of the variation in energy balance related behaviours which might play a role in development of overweight.

Associations between school environment factors and dietary behaviours have been explored in individual European countries (Maes and Lievens, 2003; West et al., 2004; Vereecken et al., 2005; van der Horst et al., 2008a; Bere et al., 2008; Krølner et al., 2009; Wouters et al., 2010; Townsend et al., 2011; Townsend and Foster, 2013; Gebremariam et al., 2012), but significant associations were found with consumption of unhealthy foods only in a study from Wales (Townsend et al., 2011; Townsend and Foster, 2013). The authors explain this finding by pointing to their large sample size of schools and pupils, and the many variables included at the two levels of their social ecological model (Townsend and Foster, 2013). In contrast the following explanations for the lack of associations are proposed: lack of variation between schools (Vereecken et al., 2005; Krølner et al., 2009), and establishment of dietary behaviours at an earlier age, personal or family factors being more important than school environment factors (West et al., 2004; van der Horst et al., 2008a; Gebremariam et al., 2012), as well as methodological issues such as misspecifications of context and lack of validated and reliability tested school level measures (Townsend et al., 2011; Gebremariam et al., 2012).

It is agreed that sugar-sweetened beverages have low nutritional value, but the exact contribution to the obesity epidemic and other health outcomes is still debated (de Ruyter et al., 2012; Malik and Hu, 2011). Soft drinks were shown to contribute the most energy of the 10 beverage groups studied among adolescents in the cross-European HELENA-study (Duffey et al., 2012). The ENERGY cross-sectional survey found that soft-drink consumption varied by country and parental education with a high of more than 500 ml/day in the Netherlands and a low of a little more than 100 ml/day in Greece (Brug et al., 2012a; 2012b). Furthermore, soft drinks are readily available and may be seen as an indicator of adolescents' own food choice which makes it a relevant outcome to be associated with school nutrition environment factors.

The primary aim of this study was to describe and explore differences in school nutrition environment factors in elementary schools across seven countries in Europe. A secondary aim was to explore whether any of these school nutrition environment factors were associated with soft drink consumption of young adolescents.

2. Methods

The EuropeaN Energy balance Research to prevent excessive weight Gain among Youth (ENERGY) project includes a cross-sectional, school-based survey providing data on anthropometrics and energy balance related behaviours across seven European countries representing Northern/Central (Belgium, the Netherlands, Norway), Southern (Greece, Spain) and Eastern-Europe (Hungary, Slovenia). The target group of 10–12 year olds was chosen because this is a transition stage between childhood and adolescence where they become more autonomous from their parents in their behavioural choices. The project (Brug et al., 2010) and the design and methods of the cross-sectional survey are previously published (van Stralen et al., 2011). The survey was conducted between March and July 2010. A national sample frame was used in Greece, Hungary, the Netherlands and Slovenia, while schools from specific regions were sampled in Spain, Belgium and Norway. The clustering of the survey was taken into account in sample size calculations. A school recruitment letter was sent to the headmaster of the sampled schools, followed by a personal telephone call. All pupils in the classes covering the targeted age group were eligible for participation. The parents provided written consent for their child and themselves. The project adhered to the Helsinki Declaration and the conventions of the Council of Europe on human rights and biomedicine. All participating countries obtained ethical clearance from the relevant ethical committees and ministries.

2.1. Data collection

All measures are obtained using standardized protocols and methods/tools across the countries (van Stralen et al., 2011). A school management questionnaire (SMQ) was delivered to the school management by the research team. Schools that did not return the questionnaire were contacted for a reminder. Two research assistants independently completed an audit instrument at the day of questionnaire administration at each school. The observers resolved disagreement before entering one set of data per school into the file which was sent to the data coordinating centre. A total of 175 schools participated (van Stralen et al., 2011), of which 160 schools responded to the school management questionnaire and 171 audits were conducted.

The children completed questionnaires and anthropometric measurements during school time. Test–retest reliability of the child questionnaire was tested by administrating the questionnaire twice with a 1-week interval among 720 schoolchildren across the participating countries (Singh et al., 2011). Trained research assistants measured body height and weight (van Stralen et al., 2011). One parent questionnaire was brought home by the child and returned through school. The response rates of the child questionnaire were above 90% except in the Netherlands (89%) and Belgium (82%), whereas the response rate to the parent questionnaire was above 80% except for Belgium (62%) and the Netherlands (44%) (van Stralen et al., 2011).

2.2. Variables

2.2.1. School nutrition environment and background factors

The SMQ and audit instruments were based on the following studies – the Pro Children (de Bourdeaudhuij et al., 2005), ENDORSE (van der Horst et al., 2008b) and IDEA (Lytle, 2009b), as well as general assessment tools developed by the ANGELO-framework (Swinburn et al., 1999). The SMQ was developed to assess the four types of school environment according to the ANGELO-framework (Swinburn et al., 1999). The first draft of the SMQ was revised based on reviews by members of the ENERGY-consortium and external experts, and then pretested by principals in two to three schools in each of the seven participating countries for clarity and face validity before finalization. The audit instrument was primarily based on the ENDORSE study (van der Horst et al., 2008b) and aimed to assess availability of food and drinks as well as opportunities to be physically active.

This study includes the physical, political and sociocultural environmental factors from the SMQ (see Supplementary data file for exact wording), and also background variables about the school and a few physical environmental factors from the audit. The questions on economic factors were omitted as they were mostly