



Associations between sociocultural home environmental factors and vegetable consumption among Norwegian 3–5-year olds: BRA-study



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ABSTRACT

The home environment is the first environment to shape childhood dietary habits and food preferences, hence greater understanding of home environmental factors associated with vegetable consumption among young children is needed.

The objective has been to examine questionnaire items developed to measure the sociocultural home environment of children focusing on vegetables and to assess the psychometric properties of the resulting factors. Further, to explore associations between the environmental factors and vegetable consumption among Norwegian 3–5 year olds.

Parents (n 633) were invited to participate and filled in a questionnaire assessing the child's vegetable intake and factors potentially influencing this, along with a 24-h recall of their child's fruit and vegetable intake. Children's fruit and vegetable intakes at two meals in one day in the kindergarten were observed by researchers.

Principal components analysis was used to examine items assessing the sociocultural home environment. Encouragement items resulted in factors labelled "reactive encouragement", "child involvement" and "reward". Modelling items resulted in the factors labelled "active role model" and "practical role model". Items assessing negative parental attitudes resulted in the factor labelled "negative parental attitudes" and items assessing family pressure/demand resulted in the factor labelled "family demand". The psychometric properties of the factors were for most satisfactory. Linear regression of the associations between vegetable intake and the factors showed, as expected, generally positive associations with "child involvement", "practical role model" and "family demand", and negative associations with "negative parental attitudes" and "reward". Unexpectedly, "reactive encouragement" was negatively associated with vegetable consumption.

In conclusion, associations between sociocultural home environmental factors and children's vegetable consumption showed both expected and unexpected associations some of which differed by maternal education – pointing to a need for further comparable studies.

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1. Introduction

Research suggest that early nutrition are important for health later in life (Patro-Golab et al., 2016; Tandon et al., 2016; Zalewski et al., 2017). For example a recent systematic review on the association between diet in the preschool years and mental

development show that overall, healthy dietary patterns in the preschool years are associated with better cognitive outcomes three to fifteen years later (Tandon et al., 2016). Inadequate consumption of fruits and vegetables is linked to an increased risk of non-communicable diseases such as cardiovascular diseases, cancers, chronic respiratory diseases and diabetes type 2 (Hu, Huang, Wang, Zhang, & Qu, 2014; Li, Fan, Zhang, Hou, & Tang, 2014; Wang et al., 2014). Evidence also indicates tracking of dietary intake from childhood to adulthood (Bjelland et al., 2013; Craigie, Lake, Kelly, Adamson, & Mathers, 2011; Lien, Lytle, & Klepp, 2001; Totland et al., 2013) hence early childhood represents a critical period for establishing long-lasting dietary habits (Bjelland

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et al., 2013). Despite health benefits of diets rich in fruits and vegetables, many countries face a challenge with regard to low intake of vegetables (Micha et al., 2015). This is also the case in Norway where the latest national dietary surveys among adults (Norwegian Directorate of Health, 2012), school children (Norwegian Institute of Public Health, 2016b) and preschool children (Norwegian Directorate of Health, 2002; Kristiansen, Lande, & Andersen, 2009; Norwegian Directorate of Health, 2009; Øverby, Kristiansen, Andersen, & Lande, 2009) all report low consumption of vegetables.

In a life course perspective the home environment is acknowledged as the first environment to shape childhood dietary habits and food preferences (Rosenkranz & Dziewaltowski, 2008). The home environment can be characterized by three domains; the physical environment, the sociocultural environment and the political/economic environment (Rosenkranz & Dziewaltowski, 2008), where each environment individually could play an important role through a variety of factors influencing vegetable consumption among young children. Reviews primarily including school aged-children show that home availability and accessibility are strong positive physical factors associated with fruit and vegetable consumption (Blanchette & Brug, 2005; Cook, O'Reilly, DeRosa, Rohrbach, & Spruijt-Metz, 2015; Krolner et al., 2011; Pearson, Biddle, & Gorely, 2009; Rasmussen et al., 2006; van der Horst et al., 2007). This is also supported by findings from our study among Norwegian 3–5 year olds, where home availability and accessibility are positively associated with vegetable consumption (Kristiansen, Bjelland, Himberg-Sundet, Lien, & Andersen, 2017). One area within the sociocultural home environment of young children that has received a lot of attention lately is parental feeding practices. A range of instruments to measure parental feeding practices has been developed (de Lauzon-Guillain et al., 2012; O'Connor et al., 2016; Vaughn, Tabak, Bryant, & Ward, 2013). Inconsistency in labelling and definitions used for describing such practices make comparisons across studies challenging (Gevers, Kremers, de Vries, & van Assema, 2014; Vaughn et al., 2013, 2016). Still, reviews among children up to 18 years of age point to parental intake, parental modelling and parental encouragement as important sociocultural factors positively associated with fruit and vegetables consumption (Blanchette & Brug, 2005; Pearson et al., 2009; Rasmussen et al., 2006; van der Horst et al., 2007). Finally, as an economic home environmental factor, high parental socioeconomic position is associated with higher fruit and vegetable intake among children (Krolner et al., 2011; Rasmussen et al., 2006; van der Horst et al., 2007). It is important to note that associations between characteristics of the home environment and vegetable intake often are reported together with fruit intake (Blanchette & Brug, 2005; Krolner et al., 2011; Rasmussen et al., 2006; van der Horst et al., 2007) even though there are likely to be differences in factors associated with the two food groups (Glasson, Chapman, & James, 2011), hence greater understanding of home environmental factors associated with vegetable consumption among young children is needed.

Although there are a large number of instruments developed to assess parental feeding practices in general, the advantage of more specific measurements of the sociocultural home environment focusing on vegetables (e.g. parental vegetable feeding practices) is so far less explored (Vaughn et al., 2016). The present study aims to address this gap by firstly examining item pools developed to measure the sociocultural home environment of Norwegian preschool children focusing on vegetables, and to assess the psychometric properties of the resulting factors. Moreover, the study aims to explore associations between factors of the sociocultural home environment and vegetable consumption among these children.

2. Methods

2.1. Study design and subjects

The BRA-study (an acronym for the Norwegian words “Barnehage” (kindergarten), “gRønnsaker” (vegetables) and “fAmilie” (family)) is an intervention study with an overall aim to improve vegetable intake among preschool children (3–5 years at baseline) through changing the food environment and dietary practices in the kindergarten and the home. More specifically, the aim was to increase the daily frequency of vegetable intake, was to increase the variety of vegetables eaten over a month and was to increase the daily amount of vegetables consumed. The target group for the BRA-study is preschool children born in 2010 and 2011, attending public or private kindergartens in the counties of Vestfold and Buskerud, Norway. All 479 public and private kindergartens in these two counties were invited by letter to participate in the BRA-study. Seventy-three kindergartens chose to participate (response rate 15.2%). Parents of 1631 children born in 2010–2011 in the 73 kindergartens were invited by letter to participate. Parental consent was obtained for 633 children (response rate 38.8%). Families were allowed to participate with more than one child (n 45 children in total sample were siblings). Number of participating children in each kindergarten varied from no children up to 23 children. For the present study, only data from the baseline surveys among parents and the baseline observation (see Step 1–3 below) of the children were included.

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the Norwegian Social Science Data Services. Written informed consent for the child was obtained from all parents who agreed to participate (n 633).

2.2. Design and methods

The design of the study is similar to that presented earlier (Kristiansen et al., 2017). In brief, data about the child and the home environment were collected in three steps at baseline (Fig. 1): Step 1) a parental web-based questionnaire assessing frequency and variety of the child's vegetable intake, as well as factors potentially influencing the child's vegetable consumption was filled in for 439 children (69% of the 633 participants).

Step 2) among a subsample (n 411) of the participating children (65% of the 633 participants), a direct observation of the children's fruit, berries and vegetable intakes at two meals in one day in the kindergarten was conducted.

Step 3) a parental web-based 24-h recall for assessing the child's intake of fruit, berries and vegetables was filled in for 470 children (74% of the 633).

Number of children having data from all three steps was 246.

2.2.1. Step 1: A parental web-based questionnaire

In March 2015, all parents of participating children in the BRA-study (n 633) received a link to a web-based questionnaire by e-mail. If the family participated with more than one child, parents were instructed to answer separately for each child. One e-mail reminder was sent out to non-responders about 3 weeks after the first e-mail.

The questionnaire had been tested in a pilot study with 10 mothers and then revised, for more information see Kristiansen et al. (Kristiansen et al., 2017). The final questionnaire included 53 questions, divided in two parts. The first part of the questionnaire primarily aimed to measure the usual vegetable intake, and parents were asked to think about the last couple of months. Frequency and variety of 18 different types of vegetables were assessed with the

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