



The relationship between controlling feeding practices and boys' and girls' eating in the absence of hunger



Holly Harris, Kimberley M. Mallan^{*}, Smita Nambiar, Lynne A. Daniels

School of Exercise and Nutrition Science and Institute of Health and Biomedical Innovation, Queensland University of Technology, Kelvin Grove, Brisbane, QLD 4059, Australia

ARTICLE INFO

Article history:

Received 19 March 2014

Received in revised form 7 May 2014

Accepted 14 July 2014

Available online 23 July 2014

Keywords:

Eating in the absence of hunger

Child eating behavior

Self-regulation

Controlling feeding practices

ABSTRACT

Parental controlling feeding practices have been directly associated with maladaptive child eating behaviors, such as eating in the absence of hunger (EAH). The aims of this study were to examine EAH in very young children (3–4 years old) and to investigate the association between maternal controlling feeding practices and energy intake from a standardized selection of snacks consumed 'in the absence of hunger'. Thirty-seven mother–child dyads enrolled in the NOURISH RCT participated in a modified EAH protocol conducted in the child's home. All children displayed EAH, despite 80% reporting to be full or very full following completion of lunch 15 min earlier. The relationships between maternal and child covariates and controlling feeding practices and EAH were examined using non-parametric tests, and were stratified by child gender. For boys only, pressure to eat was positively associated with EAH. Neither restriction nor monitoring practices were associated with EAH in either boys or girls. Overall, the present findings suggest that gender differences in the relationship between maternal feeding practices and children's eating behaviors emerge early and should be considered in future research and intervention design.

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1. Introduction

The use of controlling feeding practices by parents has been hypothesized to increase a child's risk of overeating and becoming overweight. The mechanism through which this relationship is hypothesized to occur is that extrinsic controlling feeding practices undermine the child's ability to recognize and respond appropriately to cues of hunger and satiety; thus their intrinsic capacity to self-regulate energy intake is compromised (Faith, Scanlon, Birch, Francis, & Sherry, 2004; Gregory, Paxton, & Brozovic, 2010).

'Eating in the absence of hunger' (EAH) is conceptualized as a heightened response to food cues characterized by a child's inability to self-regulate energy intake (Francis & Birch, 2005). This is particularly likely to occur in the presence of energy-dense palatable foods. Observational studies have found that over 90% of children ate snacks when they were offered, despite having just eaten a meal, demonstrating the propensity for eating to be reinstated in a satiated child in the presence of palatable snack cues (Hill et al., 2008). Adiposity and BMI Z score have been positively correlated with EAH in various age groups through observational or self-reported measures (Hill et al., 2008; Kral et al., 2010; Shomaker et al., 2010; Tanofsky-Kraff et al., 2008; Zocca et al., 2011).

To date there is limited research investigating EAH in very young children and how this behavior may be related to parental controlling feeding practices. Furthermore, there is inconsistent evidence for whether controlling feeding practices impact boys and girls similarly (Blissett, Meyer, & Haycraft, 2006; Faith et al., 2006; Francis & Birch, 2005; Moens & Braet, 2007; Rhee et al., 2009). One observational, longitudinal study (Francis & Birch, 2005) found that maternal restrictive feeding practices when daughters were aged 5 were a significant predictor for EAH at the age of 9, but this was dependent on mother's BMI. There has been limited investigation of maladaptive eating behaviors in younger children, in their own food environment.

The purpose of the present study was to pilot a novel modification of the EAH paradigm in order to investigate whether self-reported maternal controlling feeding practices (pressure to eat, restriction and monitoring) were associated with EAH in preschool aged boys and girls.

2. Methods

2.1. Study design and participants

Participants in the current study were recruited from the NOURISH randomized controlled trial (RCT) (Daniels et al., 2009). NOURISH aimed to evaluate the efficacy of a community-based intervention that provided anticipatory guidance of feeding practices to first-time mothers. The NOURISH RCT enrolled 698 first-time mothers from two Australian capital cities, Brisbane and Adelaide, in 2008–2009. Eligibility criteria included: term infants >35 weeks,

^{*} Corresponding author at: Institute of Health and Biomedical Innovation, Queensland University of Technology, 60 Musk Ave., Kelvin Grove, Brisbane, QLD 4059, Australia. Tel.: +61 7 3138 6171; fax: +61 7 3138 6030.

E-mail address: kimberley.mallan@qut.edu.au (K.M. Mallan).

≥2500 g; mothers ≥18 years, primiparous; and a facility with spoken and written English. Infants with diagnosed congenital abnormalities or chronic health conditions were not eligible. Further details on the recruitment and retention protocols for NOURISH have been described in detail elsewhere (Daniels et al., 2009, 2012).

NOURISH data collection occurred at: birth; T1 (4 months), T2 (14 months), T3 (2 years), and T4 (3.7 years). The present study commenced immediately following T4. Only active NOURISH participants living in Brisbane (N = 180) were invited to participate. Children with a diagnosed food allergy/intolerance or behavioral, sleep or medical conditions which may affect eating were not eligible.

Approval for the NOURISH RCT was obtained from 11 Human Research Ethics Committees covering the Queensland University of Technology (QUT), Flinders University and all the recruitment hospitals. The trial was registered with the Australian and New Zealand Clinical Trials Registry Number 12608000056392. Approval for the present study was obtained from QUT.

2.2. Materials and measures

2.2.1. Semi-standardized lunch and standardized snacks

The lunch items included one sandwich consisting of two slices of bread (white/wholemeal/wholegrain), spread (butter/margarine/mayonnaise), and filling (ham/ham and cheese/cheese/chicken/chicken and cheese/egg); 250 mL of full fat milk or 175 g of flavored yogurt; and fruit (fresh/tinned/100% fruit juice). The lunch serving provided on average ~2700 kJ which is almost half of their daily energy requirement; estimated to be ~6000 kJ (BMR plus physical activity level (PAL) of 1.6) (National Health and Medical Research Council, 2005). The snack items included savory biscuits, sweet biscuits, fruit 'leathers', potato chips and a cereal bar; providing a total of 2104 kJ.

2.2.2. Covariates

Maternal and infant characteristics collected in NOURISH included: maternal age at delivery, education, maternal BMI and infant gender (T1). The child's age was calculated from their birth date to the day of their EAH experiment (months). Introduction to solids (weeks) was obtained from the mothers' self-report (T2). Breastfeeding duration (weeks) was derived from a corroboration of data collected across T1–T3 (Howard, Mallan, Byrne, Magarey, & Daniels, 2012). Measured weight and height of the children were available from T4. The WHO Anthro software program version 3.2.2 was used to calculate the BMIZ which adjusts for age and gender using WHO reference norms (WHO Multicentre Growth Reference Study Group, 2006).

2.2.3. Controlling feeding practices

Three subscales from the Child Feeding Questionnaire (Birch et al., 2001) were used to measure controlling feeding practices: pressure to eat (4 items), restriction (8 items) and monitoring (3 items). Response options were from low (1) to high (5).

2.2.4. Eating in the absence of hunger

Eating in the absence of hunger was quantified as total energy consumed from the snacks (kJ_{snacks}). Snack foods were weighed pre- and post-experiment and energy consumed was determined using Foodworks Professional (version 9) software. This program uses the AUSTNUT 2007 database from the National Children's Nutrition and Physical Activity Survey (Food Standards Australia New Zealand, 2008).

2.2.5. Satiety scale

A validated 'Fullness Chart' was used to assess child self-reported satiety immediately following the lunch meal (Faith, Kermanshah, & Kissileff, 2002). The scale consists of 5 ordinal response options from 'empty' to 'very full'.

2.3. Procedure

The protocol for this experiment was adapted from EAH in older children (Birch, Fisher, & Davison, 2003; Faith et al., 2006; Hill et al., 2008; Kral et al., 2010; Lee & Keller, 2012) and has been described elsewhere (Mallan, Nambiar, Magarey, & Daniels, 2014). All participants were tested in their own home at their 'usual' lunchtime. A member of the research team delivered all of the food to be offered to the child but was not present during the experiment. The child's mother was provided with standardized written instructions for completing the protocol and her understanding was confirmed prior to commencement of the experiment. The mother presented the child with the lunch meal for up to 30 min or until they indicated that they felt 'full' (i.e. verbally or ceased eating). The mother then assisted her child to respond to the Fullness Chart. The child was given 15 min to engage in self-directed play after which the mother presented all snack items to the child for another 15 min as per a previous EAH protocol (Kral et al., 2010).

2.4. Data management and statistical analysis

All analyses were conducted using SPSS version 21. Bivariate analyses between feeding practices and EAH (kJ_{snacks}) and between NOURISH group allocation, covariates (see 2.2.2) and EAH were stratified by child gender as per the study aim. Due to the small sample size and non-normal distribution of some of the variables for these analyses nonparametric Spearman's rho correlations or Mann–Whitney U tests were used. None of the covariates were significantly associated with EAH thus adjusted analyses were not performed.

3. Results

Characteristics of the sub-sample of mother–child dyads are shown in Table 1. Only 2 children were overweight at T4 (BMIZ >2) (WHO, 2008). There were no baseline differences between participants from the control and intervention groups (all $p \geq .082$). Relative to the sample of N = 698 mothers enrolled in the NOURISH RCT, the sub-sample of N = 37 mothers had a similar mean age at delivery (M = 31.8, SD = 4.3 years vs. M = 32.8, SD = 4.9 years), but lower BMI at baseline (M = 23.3, SD = 3.7 vs. M = 26.0, SD = 5.3). In the current study, mothers with a university level education were overrepresented (95% vs. 58%).

Responses on the satiety scale indicated that 81% (n = 30) of the children were either 'full' or 'very full' following lunch (median = 5,

Table 1

Characteristics of the subsample of participants (N = 37 mother–child dyads) recruited from the NOURISH RCT (Daniels et al., 2009).

Variable	Median (IQR); % (n)
Maternal characteristics	
Age at delivery (years)	32 (30, 35)
University education (yes)	95 (35)
BMI (kg/m ²) ^a	21.9 (21.1, 26.1)
Breastfeeding duration (weeks) ^b	56 (45, 80)
Child age first introduced solids (weeks) ^c	24 (22, 26)
Child characteristics	
Age (months)	52 (45, 54)
Gender (female)	57 (21)
Child BMIZ ^d	0.22 (−0.20, 1.02)

^a Maternal BMI calculated from measured height and weight data collected at NOURISH baseline (T1: mean age = 4.3 ± SD = 1.0 months).

^b Data from corroboration of breastfeeding duration reported retrospectively from mother at NOURISH T1/T2/T3.

^c Infant age (weeks) when solids were first introduced, reported retrospectively at NOURISH T2 (mean age = 13.7 months ± SD = 1.3 months).

^d Calculated from NOURISH T4 measured height and weight data (mean age = 46.6 ± SD = 2.8 months).

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