Appetite 126 (2018) 108–113

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

The family child care home environment and children's diet quality

Sara E. Benjamin-Neelon[a,*], Amber E. Vaughn[b], Alison Tovar[c], Truls Østbye[d], Stephanie Mazzucca[b,e], Dianne S. Ward[b,e]

[a] Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
[b] Center for Health Promotion and Disease Prevention, University of North Carolina at Chapel Hill, NC, USA
[c] Department of Nutrition and Food Sciences, University of Rhode Island, Kingston, RI 02881, USA
[d] Department of Community and Family Medicine, Duke University Medical Center, Durham, NC, USA
[e] Department of Nutrition, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, NC, USA

ARTICLE INFO

Keywords:
Child care
Diet
Early years
Nutrition

ABSTRACT

Background: Developing healthy eating behaviors and food preferences in early childhood may help establish future healthy diets. Large numbers of children spend time in child care, but little research has assessed the nutritional quality of meals and snacks in family child care homes. Therefore, it is important to assess foods and beverages provided, policies related to nutrition and feeding children, and interactions between providers and children during mealtimes. We examined associations between the nutrition environments of family child care homes and children's diet quality.

Methods: We assessed the nutrition environments of 166 family child care homes using the Environment and Policy Assessment and Observation (EPAO) (scores range: 0–21). We also recorded foods and beverages consumed by 496 children in care and calculated healthy eating index (HEI) (scores range: 0–100). We used a mixed effects linear regression model to examine the association between the EPAO nutrition environment (and EPAO sub-scales) and child HEI, controlling for potential confounders.

Results: Family child care homes had a mean (standard deviation, SD) of 7.2 (3.6) children in care, 74.1% of providers were black or African American, and children had a mean (SD) age of 35.7 (11.4) months. In adjusted multivariable models, higher EPAO nutrition score was associated with increased child HEI score (1.16; 95% CI: 0.34, 1.98; $p = 0.006$). Higher scores on EPAO sub-scales for foods provided (8.98; 95% CI: 3.94, 14.01; $p = 0.0006$), nutrition education (5.37; 95% CI: 0.80, 9.94; $p = 0.02$), and nutrition policy (2.36; 95% CI: 0.23, 4.49; $p = 0.03$) were all associated with greater child HEI score.

Conclusions: Foods and beverages served, in addition to nutrition education and nutrition policies in family child care homes, may be promising intervention targets for improving child diet quality.

1. Introduction

Child care attendance has been associated with obesity in children in a number of cross-sectional and longitudinal studies in Canada, China, Denmark, the United Kingdom (UK), and the United States (US), although other studies have found no association (Benjamin Neelon, Burgoine, Hesketh, & Monsivais, 2015a, 2015b; Benjamin et al., 2009; Geoffroy et al., 2013; Kim & Peterson, 2008; Lin, Leung, Hui, Lam, & Schooling, 2011; Maher, Li, Carter, & Johnson, 2008; McGrady, Mitchell, Theodore, Sersion, & Holtzapple, 2010; McLaren, Zarrabi, Dutton, Auld, & Emery, 2012; Pearce et al., 2010). Many of these previous studies found that use of the less formal types of care, including family child care homes, accounted for most of the observed associations with obesity (Benjamin et al., 2009; Geoffroy et al., 2013; Kim & Peterson, 2008; Lin et al., 2011; Maher et al., 2008; McLaren et al., 2012; Pearce et al., 2010). Little is known about the potential mechanisms linking child care with obesity, if such a relationship exists. The nutrition environment at child care may be an important mechanism to explore given recent studies in the US, the UK, and the Netherlands that highlight the nutritional inadequacy of foods and beverages commonly served to children in child care; specifically, meals and snacks lack sufficient fruits, vegetables, and whole grains and include excessive fats and sugars (Copeland, Benjamin Neelon, Howald, & Wosje, 2013; Frampton et al., 2014; Gubbels et al., 2014, 2015; Maalouf, Evers, Griffin, & Lyn, 2013; Neelon et al., 2015; Parker, Lloyd-Williams, Weston, Macklin, & McFadden, 2011).

* Corresponding author.
E-mail addresses: sara.neelon@jhu.edu (S.E. Benjamin-Neelon), avaughn@email.unc.edu (A.E. Vaughn), alison_tovar@uri.edu (A. Tovar), truls.ostbye@duke.edu (T. Østbye), smazzucca@wustl.edu (S. Mazzucca), dsward@email.unc.edu (D.S. Ward).

https://doi.org/10.1016/j.appet.2018.03.024
Received 7 March 2017; Received in revised form 27 February 2018; Accepted 26 March 2018
Available online 27 March 2018

Few studies, however, have assessed foods and beverages served or the nutrition environment in less formal types of care like family child care homes. Family child care homes are a particular type of licensed child care where non-relative providers typically care for children in their own homes rather than in a separate facility (i.e., child care center). In countries outside of the US, these providers may be known as "family day care" (in Australia) or "childminders" (in the UK). An analysis of menus from family child care homes in Washington showed that meals and snacks were deficient in key nutrients needed for child health, providing only 60% of the daily reference intakes after adjustment for calories consumed (Monsivais & Johnson, 2012). A survey of family child care home providers in Rhode Island found that most were motivated to serve healthy foods; however, it is unclear whether this motivation translated into actual foods served (Tovar et al., 2015). This same survey also showed that while most providers sat with children during meals, few ate the same foods as children, thus missing out on an important opportunity for role modeling. An observational study of family child care homes in Rhode Island found that providers often offered positive reinforcement in response to children's acceptance of food; however, providers also responded with controlling practices when children requested second helpings of food (Tovar et al., 2016). The low number of studies conducted with family child care homes highlights the need to conduct both observational and intervention research in this area to help improve foods and beverages served and mealtime feeding practices.

While there is growing evidence for how foods served and feeding practices in child care centers impact children's diet quality in the US and the Netherlands (Gubbels et al., 2015; Kharofa, Kalkwarf, Khoury, & Copeland, 2016), similar studies in family child care homes are lacking. There appears to be substantial room for improvement; however, few studies have targeted family child care homes (Ward, Belanger, Donovan, & Carrier, 2015; Zhou, Emerson, Levine, Kihlberg, & Hull, 2014). Here, we address this gap by examining associations between the nutrition environments of family child care homes and children's diet quality while in care. We first examine how the overall quality of the family child care home environment is associated with children's diet quality. We hypothesized that children cared for in family child care homes with higher quality nutrition environments would have better diet quality while in care. We further examine, in secondary analyses, which specific components within the nutrition environment are most associated with children's diet quality.

2. Materials and methods

2.1. Study design and population

We used baseline data from the Keys to Healthy Family Child Care Homes (Keys) study conducted from 2013 to 2016 with family child care homes across North Carolina (Ostbye et al., 2015). Keys was a cluster-randomized controlled trial that evaluated the efficacy of an intervention designed to help providers become healthy role models, improve nutrition and physical activity environments, and implement effective business practices in family child care homes. The study enrolled and measured a convenience sample of 166 family child care homes and 496 children (approximately three children per home) from central North Carolina. Eligible family child care homes had to have at least two children currently enrolled between the ages of 18 months and 4 years, serve at least one meal and one snack to children, and have been in business for two years with no plans to close in the coming year. To evaluate the Keys intervention, trained data collectors conducted two-day onsite observations to assess the nutrition environment and children's dietary intake. Data collectors were blinded to the study aims and group assignment. Detailed information about the full Keys study design and protocols have been reported in prior publications (Benjamin Neelon, Ostbye, Hales, Vaughn, & Ward, 2016a, 2016b; Ostbye et al., 2015). Briefly, to recruit family child care homes we first contacted local community partners (e.g., Health Departments) to provide information about the study. We then mailed letters of invitation to all family child care homes providers in the area and followed up with a telephone call to assess interest. Just over half (56%) were interested in participating and 75% of those family child care homes met our eligibility criteria. Of those eligible, about 25% ultimately enrolled in the study. Additional information about recruitment and consent is available elsewhere (Ward, Vaughn, Burney, & Ostbye, 2016). Child care providers and parents of children in care provided written informed consent to participate in the Keys study. All study protocols were approved by the Institutional Review Boards of the University of North Carolina at Chapel Hill and Duke University Medical Center.

2.2. Exposure: nutrition environments of family child care homes

We used the previously developed Environment and Policy Assessment and Observation (EPAO) (Ward et al., 2008) instrument that was modified to assess the family child care home nutrition environment (Vaughn et al., 2017). The instrument has been used in numerous previous studies to assess child care environments (Benjamin Neelon et al., 2016b; Messiah et al., 2017; LaRowe et al., 2016; O'Neill, Dowda, Benjamin Neelon, Neelon, & Pate, 2017). We collected EPAO data during two-day onsite visits to family child care homes. The EPAO was conducted by data collectors who had been trained (4-h workshop) and certified (4-h certification) by an EPAO "gold standard observer" employed by the developers of the instrument. The observation portion of the EPAO was conducted on both days, starting with the time children were served their first meal, generally the first activity of the day, and continued until children left the family child care home for the day. The EPAO includes 145 multi-part questions organized into 10 sections: morning meal, activities before lunch, lunch, naptime, afternoon snack, activities after lunch, activities in general, equipment/environment/space, food preparation, and additional food details. The document review was conducted during naptime, if possible, when child observation was not needed. The document review portion of the EPAO includes 12 multi-part questions organized into two sections: training and education, and policy. We focused on the EPAO total nutrition score, which uses a combination of observation and document review data, as the primary exposure.

The nutrition-related sections of the EPAO are used to assess compliance with 38 nutrition best practices, each of which is rated on a scale of 0–3, where higher scores indicate closer compliance. These best practices are then grouped into 7 sub-scales reflecting various aspects of the overall nutrition environment within family child care homes. Scores on individual best practices are averaged to determine the sub-scales score; hence, sub-scale scores range between 0 and 3. Sub-scale scores are then summed to determine the total score, with scores ranging from 0 to 21 and higher scores indicating better quality nutrition environments. In secondary analyses, we examined each of the 7 nutrition sub-scales within the EPAO, including foods provided (12 items), beverages provided (5 items), feeding environment (7 items), feeding practices (8 items), menus and variety (1 item), nutrition education (4 items), and nutrition policy (1 item) (Table 1). In both the original development and in the recent modification of the EPAO, we conducted inter-rater but not internal consistency reliability testing, because these sub-scales included such diverse items (Ward et al., 2008).

2.3. Outcome: child diet quality in the family child care home

To assess children's diet quality in the family child care home we conducted the Diet Observation at Child Care (DOCC) over 2 full days of child care (Ball, Benjamin, & Ward, 2007). The DOCC is an adaptation of instruments that have been used previously with preschool and elementary school children (Baxter, Thompson, Litaker, Frye, & Guinn, 2002; Gittelsohn, Shankar, Pokhrel, & West, 1994), and has been tested for validity and reliability in children in child care (Ball et al., 2007).