

Child-care self-assessment to improve physical activity, oral health and nutrition for 2- to 4-year-olds: a feasibility cluster RCT

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Scientific summary

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Scientific summary

Background

Twenty-two per cent of children in England starting primary school are overweight or obese. Preschool children are not achieving the recommended 180 minutes of physical activity (PA) per day. Scalable interventions are required that facilitate children to be physically active and to establish healthy dietary habits. Most children in England aged 3–4 years attend some formal child care; therefore, these settings provide an opportunity to create environments that promote adequate PA and a healthy diet.

Systematic reviews have identified the paucity of preschool obesity prevention research. A 2016 Cochrane review of interventions in early years settings found weak and inconsistent evidence of the effectiveness of improving child-care service staff knowledge or attitudes, diet, PA or weight and concluded that ‘further research in the field is required’ (Wolfenden L, Jones J, Williams CM, Finch M, Wyse RJ, Kingsland M, *et al.* Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services. *Cochrane Database Syst Rev* 2016;**10**:CD011779). To address this, we drew on evidence from the Nutrition And Physical Activity Self Assessment for Child Care (NAP SACC) intervention in the USA, which showed evidence of effectiveness but had not been adapted for use in the UK (Ward DS, Benjamin SE, Ammerman AS, Ball SC, Neelon BH, Bangdiwala SI. Nutrition and physical activity in child care: results from an environmental intervention. *Am J Prev Med* 2008;**35**:352–6).

Objectives

Primary objective

To assess whether or not prespecified criteria relating to the feasibility and acceptability of the intervention and trial design were met sufficiently for progression to a definitive randomised controlled trial (RCT).

Secondary objectives

To explore the experiences of nursery staff, the intervention delivery team and parents regarding acceptability, barriers, facilitators, fidelity of intervention delivery, data collection methods, participant burden and feasibility of long-term follow-up, with the aim of informing refinement of the intervention and study design prior to a potential full-scale RCT.

To pilot primary and secondary outcome measures and economic evaluation methods and to determine the practicality of data linkage for body mass index (BMI).

To calculate the sample size required for a full-scale RCT and the likely recruitment, attendance, adherence and retention rates.

Additional objectives

Two additional substudies were undertaken, with the aims of (1) establishing the test–retest reliability of the mediator questionnaire for parents and nursery staff and (2) establishing the feasibility of taking photographs of food/drink served and consumed in nurseries to estimate portion size and caloric intake.

Methods

The study was conducted with two phases and two subsequent substudies.

Phase 1 methods

In phase 1, the NAP SACC materials were adapted for use in the UK and a home component was developed. A purposive sample of 16 nurseries in North Somerset and Cardiff were invited to participate in focus groups or telephone interviews to inform the development of NAP SACC UK. Recruited child-care settings sent letters to parents/carers with children aged 2–4 years. The letters invited participation in telephone interviews to discuss the intervention and trial. We conducted interviews with parents/carers until saturation in identifying ways to adapt the NAP SACC intervention was reached. Local authority public health and early years/staff and health visitors were invited to take part in focus groups and interviews to explore which aspects of NAP SACC needed to be adapted, how to involve parents, staff training, participation and adherence.

Following the adaptation of the intervention, we invited parents in North Somerset who took part in the phase 1 to participate in a focus group and interviews to discuss the home component.

Phase 2 methods

A feasibility cluster randomised controlled trial with embedded process and economic evaluations.

Participants

The study was undertaken in nurseries in North Somerset and Gloucestershire (England) and the homes of recruited children. The inclusion and exclusion criteria were as follows.

Inclusion criteria

- Nurseries: child-care settings in North Somerset and Gloucestershire providing at least one main meal daily with a minimum of 20 children aged 2–4 years attending for ≥ 12 hours per week, over 50 weeks annually or ≥ 15 hours per week termly.
- Staff: nursery managers and staff in settings recruited to the trial.
- NAP SACC partners: health visitors employed in North Somerset and Gloucestershire.
- Children: children aged 2–4 years attending child care for ≥ 12 hours per week over 50 weeks annually or ≥ 15 hours per week termly, and provided with at least one main meal.
- Parents/carers: having a child aged 2–4 years attending a nursery recruited into the trial.

Exclusion criteria

- Child-care settings in North Somerset and Gloucestershire that were child minders; crèches; playgroups; primary school reception classes, where schools operated an early-admission policy to admit 4-year-olds; or au pairs.
- Children whose parents knew that the child would be leaving the child-care provider during September 2015 to August 2016.
- Children whose parents/carers refused consent for measurements.

Recruitment and consent

A maximum variability approach was initially used to sample nurseries. This involved inviting nurseries according to location (North Somerset or Gloucestershire) and Index of Multiple Deprivation (IMD) (three levels, defined separately for the two locations) and size (small/large, defined separately by a median split for the six locations by IMD combinations). Nurseries in each group were randomly chosen and invited by letter to consent to take part, with additional nurseries invited if a nursery declined, until a total of 12 nurseries were recruited, with six from North Somerset and six from Gloucestershire. Parents of children aged 2–4 years in the recruited nurseries were invited to give opt-in consent for the child measurements; additional consent was requested for data linkage to BMI data collected in schools.

For the process evaluation, all NAP SACC UK (Nutrition And Physical Activity Self Assessment for Child Care UK version) partners, all nursery managers and one nursery staff from each intervention nursery were invited to take part in an interview. All parents who gave consent were invited to take part in a telephone interview.

Intervention

Health visitors supported nursery staff to (1) review their nutrition, oral health, PA and screen time environment policies and practices against best practice and national guidelines, (2) set goals and (3) provide targeted assistance to meet goals they set over 5 months. Two workshops were delivered to nursery staff by local experts in nutrition and PA. A home component [website, short message service (SMS) and e-mails] was developed to support parents in setting goals.

Mediator questionnaire test–retest substudy

Nurseries in Bristol were invited by e-mail to take part in the test–retest mediator (parental and nursery staff knowledge, motivation and self-efficacy) questionnaire study and an invitation to take part was posted on the website www.netmums.com (London, UK). Inclusion criteria were self-identifying nursery staff and parents or carers who worked with or had children aged 2–4 years, respectively.

Nursery food photography feasibility substudy

A purposeful sample of four nurseries in Bristol were recruited to allow for variation in deprivation and meal provision (nursery-provided food and family-provided food). Parents of 2- to 4-year-olds who were going to be present on the day of data collection were informed about the study and could opt their child out of the study.

Data collection procedures and analysis

Phase 1 data collection procedures and analysis

A purposive sample of eight nurseries child-care providers in North Somerset and eight child-care providers in Cardiff were sent a letter inviting their staff to take part in focus groups or telephone interviews to inform the development of the NAP SACC trial. Child-care providers were purposively sampled based on local staff's local knowledge of providers who were likely to be interested in taking part in the study and from a range of settings.

Health visitors in North Somerset, staff working on the Healthy and Sustainable Preschool Programme in Cardiff, and public health and early years staff working at local authorities in North Somerset and Cardiff were invited to take part in separate focus groups or interviews. All interview recordings were transcribed verbatim and anonymised. Relevant content was coded and analysed using thematic analysis.

The adapted NAP SACC UK was a 5-month programme delivered to child-care providers in two English local authorities.

Phase 2 data collection procedures and analysis

In the feasibility trial, baseline data were collected from consented children aged 2–4 years, their parents and staff between October 2015 and January 2016 and followed up between June 2016 and November 2016. Nursery measurements included the UK version of the Environment and Policy Assessment and Observation and nursery staff's Review and Reflect score. Child measurements included height and weight to calculate body mass index z-scores (zBMI), accelerometer-determined minutes of moderate to vigorous PA, total PA and sedentary time per day, screen time and dietary outcomes using the Child and Diet Evaluation Tool. Questionnaires with nursery staff and parents measured mediators (knowledge, motivation and self-efficacy), quality of life (Paediatric Quality of Life Inventory), and nursery, family and health-care costs.

For the process evaluation, interviews with four NAP SACC UK partners, 12 nursery managers and four nursery staff were conducted. All parent interviews ($n = 20$) were conducted over the telephone. Semistructured interview guides were used for all interviews to ensure that key topics were covered, while allowing participants to discuss other issues they felt were important. Interviews were audio-recorded on an encryptable device and then transcribed verbatim. Observations of one training event, eleven workshops and five meetings were assessed using a semistructured framework.

Mediator questionnaire test–retest substudy procedures and analysis

Participating nursery managers recruited nursery staff and parents via e-mail, and the respective questionnaires were sent out as a weblink and completed twice, 1 week apart. A small number of parents were recruited online via www.netmums.com. The acceptability of the questionnaires was explored by looking at response rates and missing data. Cronbach's α coefficients were used to look at the internal consistency of the four scales (i.e. nutrition self-efficacy, PA self-efficacy, nutrition motivation and PA motivation). Test–retest analyses (weighted kappa coefficients and paired *t*-tests) were used to determine whether the items/scales are reliable.

Nursery food photography feasibility substudy procedures and analysis

Four nurseries were recruited. Photographs of food/drink were taken of as many consented children as possible to determine the feasibility of data collection before the child had eaten anything and after to capture leftovers, with additional photographs if additional food was served. A standard credit-card-sized marker was included in all photos to estimate portion size. Different foods were separated to aid portion size assessment. A reference meal of composite dishes was photographed, and ingredients of the meal weighed on scales and recipes documented. The type and number of drinks was recorded and the volume of a standard cup was measured. Nursery staff were asked to complete a questionnaire about their views of the acceptability of the data collection.

The photographs were submitted for analysis to an organisation specialised in estimating food portion and nutrient data using food photography. Trained staff used the photographs and annotations to match foods to a UK food composition database. Portion size was estimated by comparing the photograph to standard photographs where portion size (grams) was known. Questionnaire data from nursery staff were summarised using descriptive statistics.

Results

Phase 1 results

Four focus groups were conducted with public health and early years staff (15 staff). Twelve nursery managers participated and 31 parents were interviewed by telephone. Staff were positive about the NAP SACC approach using self-assessment, action-planning and staff workshops. Although health visitor involvement was welcomed, there was concern about their lack of capacity or knowledge to deliver workshops. Although the standard of nutrition in nurseries was reported to be good, the extent to which nutrition guidance was used varied between settings, with some using no nutritional guidance at all. Most nurseries had space for the children to be physically active, which was usually outdoors. There was variation in the extent to which the outdoor space was used 'all weather' or on fine days only. Screen time was limited across settings, with few including television time in their daily routines. There was concern about child oral health and interest in this being included. Parents suggested involving the whole family in the home component and linking with themes in nurseries. Online tip-sharing forums for parents were also suggested.

Phase 2 results

We recruited 12 out of 38 (31.6%) nurseries and 168 out of 476 (35.3%) children aged 2–4 years. No nurseries withdrew from the study. The intervention was delivered as planned in five out of the six intervention nurseries with high levels of feasibility and acceptability (the sixth nursery staff did not have capacity to take part fully). It was feasible to recruit and train health visitors to deliver the intervention, but health visitors reported that they may not have capacity to deliver the intervention alongside their usual workload. The number of children lost to follow-up was 24 (14.2%), due to withdrawal of consent (1.8%), child refusal to participate on the day (1.2%), children moving to primary school (6.5%) or moving nursery (4.7%). The response rate was 145 children (85.8%) at follow-up. There was suggestion of promise for the intervention increasing accelerometer-measured moderate to vigorous PA on nursery days (24.0 to 32.5 minutes for the intervention arm; 21.6 to 24.4 minutes for the control arm) and total activity

(151.6 to 172.1 minutes for the intervention arm; 148.1 to 154.2 for the control arm), which were not seen on non-nursery days. There was further suggestion of promise for the intervention increasing the quality of snacks, decreasing the amount of screen time at home, and decreasing the proportion of children who were overweight or obese. Many parental and nursery mediators of knowledge and motivation improved in the intervention arm with little change in self-efficacy. Intervention nursery Review and Reflect scores increased by 9%. A mean of eight goals were set per intervention nursery. Ninety-one per cent of parents who responded gave consent for data linkage to school height and weight data. Fourteen per cent of parents used the home component. The intracluster correlation coefficient for total PA was 0.02 (95% confidence interval < 0.0001 to 0.95). The average cost of delivering the intervention was estimated at £1184 per nursery; nurseries incurred on average an additional £717 for staff to attend the two workshops.

Mediator questionnaire test-retest results

The analyses demonstrated that the scales show good internal consistency and test-retest reliability.

Nursery food photography feasibility results

Four nurseries (57%) took part in the nursery food photography feasibility substudy; 4% (7/180) of parents opted out of the study. Data from 51 children were collected for at least one eating occasion. It is feasible and acceptable for children, parents and nursery staff to collect diet data in a nursery setting by taking photographs. A combination of photographic and observational data can be collected by two fieldworkers from 10 children, providing that the children are seated on the same table for all meals and children are served sequentially.

Conclusions

The adaptation stage of the study demonstrated the approach used by NAP SACC was broadly acceptable to nurseries in the UK, with recommendations for training delivery and including oral health. The NAP SACC UK intervention and trial methods were found to be feasible and highly acceptable to participants, except for the home component. The mediator questionnaire was found to be reliable and the food photography was found to be a feasible method of data collection in nurseries. There was sufficient suggestion of promise to justify a full-scale trial, with some adaptations to the interventions and methods. A multicentre cluster randomised controlled trial to evaluate the effectiveness and cost-effectiveness of NAP SACC UK has been funded by NIHR and will start in July 2019 (PHR NIHR 127551).

Trial registration

This trial is registered as ISRCTN16287377.

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