Preventive Medicine 54 (2012) 55–60

Contents lists available at SciVerse ScienceDirect

Preventive Medicine

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

An observational study on socio-economic and ethnic differences in indicators of sedentary behavior and physical activity in preschool children ☆

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ARTICLE INFO

Available online 29 October 2011

Keywords:
Ethnicity
Socio-economic
Sedentary
Inactivity
Epidemiology
Preschool

ABSTRACT

Objective. We studied associations between social disadvantage and indicators of sedentary behavior and physical activity at preschool age.

Methods. Data from 4688 children enrolled in a birth cohort in Rotterdam, the Netherlands, between 2002 and 2006 were analyzed. Indicators of sedentary behavior (watching television ≥ 2 h/day and sitting in a buggy ≥ 0.5 h/day) and physical inactivity (playing outside < 3 h/day) were measured by a parent-reported questionnaire at age 3. Adjustments were made for social circumstances and indicators of health behaviors. Logistic regression was used to obtain odds ratios (OR) and 95% confidence intervals (CI).

Results. Children with low-educated mothers (OR: 3.27, 95% CI 2.12–5.05) and non-Dutch children ($OR_{nonWestern}$: 2.67, 95% CI 2.04–3.49, $OR_{Western}$: 2.09, 95% CI 1.42–3.0) were more likely to watch television for at least 2 h/day. Similar results were seen for sitting in a buggy for at least 0.5 h/day. Non western children were more likely to play outside for less than 3 h/day (OR: 1.95, 95% CI: 1.39–2.73) than native Dutch children, while no differences were seen for other western children or children from mothers with a low educational level.

Conclusions. Socio-economic status and ethnicity are already associated with indicators of sedentary lifestyles at preschool age.

Introduction

An unhealthy lifestyle, characterized by sedentary behaviors and lack of physical activity are highly prevalent in childhood. (Reilly, 2008) There is some evidence that associations between sedentary behaviors and body mass index and level of fitness already occur in preschool children (Chinapaw et al., 2011). Physical activity in preschool children may be linked to bone strength, motor skills, and fitness. (Timmons et al., 2007) Lifestyle behaviors tend to track from preschool age into childhood, and subsequently to adulthood (Biddle et al., 2010). Therefore, it is vital to prevent sedentary behaviors and physical inactivity in early childhood.

Underlying correlates for sedentary behaviors and physical inactivity should be known before effective interventions can be developed. Correlates are not elucidated, but are probably multidimensional (Hinkley et al., 2010). Socio-economic status and ethnicity are consistently reported to be associated with screen-viewing in children under 7 (Hoyos Cillero and Jago, 2010). Despite these correlates being unchangeable, they may be helpful in targeting groups at risk for decreased health. Only a few studies reported on the association between social disadvantage and sedentary behaviors at preschool age, and results were inconsistent (Kelly et al., 2006; Lioret et al., 2008). Literature is even scarcer on the association between social disadvantage and physical activity at this age.

The main objective of this study was to study whether socio-economic and ethnic differences in indicators of sedentary behaviors (watching television, sitting in a buggy) and physical activity (playing outside) were already present at preschool age, and if so, to what extent could mother's social circumstances and mother's health-related behavior explain these associations. The hypothesis was that there was already an association between social disadvantage and indicators of sedentary behaviors and physical activity, which could be partly explained by mother's characteristics.

☆ No financial disclosures were reported by the authors of this paper.
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doi:10.1016/j.ypmed.2011.10.016

Methods

Study design and population

This study was embedded in The Generation R study, a population-based birth cohort. Invitations to participate in the study were made to all pregnant mothers who had an expected delivery date between April 2002 and January 2006 and who lived in the study area (Rotterdam, the Netherlands) at the time of delivery. Details of the study are described elsewhere (Jaddoe et al., 2010). The study was conducted in accordance with the guidelines proposed in the World Medical Association Declaration of Helsinki, and was approved by the Medical Ethical Committee at Erasmus MC, University Medical Centre Rotterdam. Informed consent was obtained from all participants.

Postnatal consent was given by 7295 mothers. Of these 2383 (32.7%) did not provide information on watching television or playing outside at age 3 and were therefore excluded. We also excluded participants whose ethnicity was unknown, as well as those who provided no information on educational level (n = 224). We analyzed data on 4688 children (64.3%).

Measurements

Outcome measurements for this study were obtained by questionnaire. Questionnaires were sent to parents 2 weeks before the child's third birthday. After 3 weeks, a reminder was send, and after 6 weeks, parents were called and invited to complete the questionnaire. Questionnaires were available in Dutch, English, and Turkish, and on request an assistant was available to support parents filling in the questionnaire.

Social disadvantage

Mother's educational level and child's ethnicity were used as indicators of social disadvantage. Educational level was established at enrollment. The Dutch Standard Classification of Education (Statistics Netherlands, 2004a) was used to categorize 4 levels of education: low (less than 4 years of high school), mid-low (college), mid-high (Bachelor's degree), and high (Master's degree). A child is considered as non-native if one of the parents was born abroad (Statistics Netherlands, 2004b). Besides 'native Dutch', a child's ethnicity was grouped according to developmental status of country of origin into, 'other western' (European, North-American, Australia, Japan), and 'non-western' (mainly from Morocco, Turkey, and Caribbean).

Indicators of sedentary behaviors and physical activity

Watching television, time spent in a buggy, and playing outside were used as indicators for sedentary behaviors and physical activity. For all behaviors, the question was 'How much time has your child been occupied with the following in the last month'. This question was asked two times; for weekend days and weekdays. Answer categories were: none or less than 30 min/day, 30 min to 1 h/day, 1–2 h/day, 2–3 h/day, >3 h/day. The mean time spent for each behavior was calculated as follows. First, we took the middle number of minutes per category (for example, 1–2 h/day is 1.5 h/day), and multiplied this number by 5 for weekdays, and by 2 for weekend days. After summing weekend and weekdays, the number was divided by 7 to obtain the mean number of minutes spent on that behavior. We dichotomized watching television in <2 h/day and ≥2 h/day following the guidelines of the American Academy of Pediatrics. (American Academy of Pediatrics, 2001) Recommendations from different countries state that preschoolers should be physically active for at least 2 to 2 h/day (National Association for Sport and Physical Education, 2009; DHA, 2010); we dichotomized playing outside at 3 h/day. In that case we can assume that children will be at least physical active for 2 h. (Brady et al., 2008) In absence of a recommendation for time spent in a buggy, we arbitrarily dichotomized at ≥0.5 h/day and <0.5 h/day.

Covariates

Analyses were adjusted for child's sex, age, and the season during which the questionnaire was completed.

Mother's social circumstances included job status, financial difficulties, single motherhood, and number of days that the child was cared for by others. Job status was asked when her child was aged 2 years as 'Which description applies most to you at the moment?' Answer categories included 'paid job', 'self employed', 'looking for work', 'disabled', 'social benefits', 'housewife', 'student', 'other'. 'Paid job' and 'self employed' were categorized into one category and the other answer categories into 'no paid job'. The following question was asked during pregnancy to determine financial difficulties (yes, no): 'Do you have any difficulty in paying food, rent, electricity bill and suchlike?' Answer categories included 'no' (no), 'some' (yes), and 'great' (yes) difficulties. Single motherhood (yes, no) was asked during pregnancy. Number of days that the child is cared for by others was asked as follows: How many hours a week is your child cared for by: babysitter, aupair, childminder, family, creche, playgroup or other. Answer categories were: 'never', 'less than 8 h a week', '8–16 h/week', '16–24 h/week', '24–32 h/week', and 'more than 32 h/week'. The midpoints of these categories were counted for each type of child care to calculate the total number of days that a child is not cared for by the mother.

Indicators of mother's health behavior were maternal body mass index (BMI), maternal smoking, and breastfeeding status at 6 months. Maternal BMI (kg/m^2) was obtained from self-reported pre-pregnancy weight and measured height at intake, information on maternal smoking (never, until pregnancy known, during pregnancy) was obtained from questionnaires during pregnancy, and breastfeeding status at 6 months (breastfeeding, no breastfeeding) was derived from questionnaires during the first 12 months after birth.

Statistical analyses

Multiple logistic regressions were used to obtain odds ratios (OR) and 95% confidence intervals (CI). In the basic model (model 1) mother's educational level and child's ethnic background was included, adjusted for general confounders: child's age, sex, and season. In model 2, the independent contributions of mother's social circumstances and health related behavior were evaluated.

Multiple imputation was applied to handle missing values. Five imputed datasets were generated using a fully conditional specified model to handle missing values. Imputations were based on the relations between all covariates in the study (Greenland, and Finkle, 1995).

Analyses were conducted with Statistical Package for Social Sciences (SPSS) version 17.0 for Windows (SPSS Inc, Chicago, IL, USA).

Results

Of all participants, 14.7% were in the lowest educational level (less than 4 years of high school). The sample consisted of 9.5% children of other Western ethnicities, and 23.1% of non-Western ethnicities. Nearly 8% of children watched at least 2 h television per day, and 8% played more than 3 h per day outside (Table 1).

Table 2 shows the association between indicators of social disadvantage and watching television for at least 2 h per day. The lower educated the mother; the more likely it was that children watched at least 2 h television per day. Also non-Dutch western (OR: 2.09, 95% CI: 1.42–3.08) and non western (OR: 2.67, 95% CI: 2.04–3.49) children were more likely to watch television at least 2 h a day compared to native Dutch children. Mother's unemployment was independently associated with child's watching television for at least 2 h a day (OR: 1.87, 95% CI: 1.44–2.43). None of the indicators of mother's health behaviors was an independent predictor of watching television for at least 2 h a day. The other indicator of sedentary behavior, time spent in a buggy, showed similar results for indicators of social disadvantage as watching television. Mother's social circumstances were not independently associated with time spent in a buggy, but did reduce the association between social disadvantage and time spent in a buggy (Appendix 1).

Table 3 shows the association between indicators of social disadvantage and playing outside for less than 3 h/day. Children with a non-Western ethnicity (OR: 1.95, 95% CI: 1.39–2.73) less often played outside for 3 h/day compared to their counterparts. Mother's social circumstances and mother's health indicators were not independently associated with playing outside, and they hardly affected the association between social disadvantage and playing outside.