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The first 1000 days and beyond

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CHAPTER 7

SKIPPING BREAKFAST AND OVERWEIGHT IN TWO AND FIVE YEAR OLD DUTCH CHILDREN

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ABSTRACT

Skipping breakfast is associated with higher BMI in children aged 5 years and older. However, not much is known about this association in younger children.

In the Dutch GECKO Drenthe birth cohort we examined the association between breakfast skipping and objectively measured overweight at the age of 2 (n=1488) and 5 (n=1366) years old.

At 2 years 124 (8.3%) children were overweight and 44 (3.0%) did not eat breakfast daily. At 5 years 180 (13.2%) children were overweight and 73 (5.3%) did not eat breakfast daily. Children skipped breakfast more often in families of non-Dutch origin, lower educated parents and single-parents.

Breakfast skipping in 2 and 5 year-olds is rare in the Netherlands. We found no association between skipping breakfast and overweight, neither at age 2 (OR: 1.85 (95% CI: 0.61 – 5.64)) nor at age 5 (OR: 0.46 (95% CI: 0.19 – 1.11)). Also the type of breakfast was not related to overweight at 5 years, an explanation for this finding might be that skipping breakfast is not (yet) an issue in these children.

INTRODUCTION

Children who eat breakfast generally have a healthier lifestyle than those who skip breakfast^{1,2}. Eating breakfast is associated with a higher intake of micronutrients and an improved quality of diet^{2,3}. Previous studies showed that older children, girls, immigrants and children of parents with a lower socioeconomic status skip breakfast more often^{1,2,4,5}. Skipping breakfast in children is associated with higher childhood BMI^{1,2,6,7}. In 2009 in the Netherlands, approximately 5% of 10-11 years old children skipped breakfast, which increased to 33% in 16-19 year-olds⁵. Since not much is known about breakfast skipping or its association with overweight in very young children (2-5 years old), we studied these factors in this very young group.

METHODS

Data were derived from the GECKO Drenthe cohort⁸: a population-based birth cohort that studies risk factors for overweight from childhood until adulthood. In this cohort anthropometric measurements are performed by trained nurses at municipal health services at 1, 2, 3, 4, 6, 7, 9, 11, 14, 18, 24, 36, 45 and 60 months after birth. Parents answer a questionnaire about lifestyle and environment after every visit. Details about this cohort have been presented elsewhere⁸.

From 2006 onwards, 2874 parent-child pairs have ever actively participated in the cohort, all mothers signed informed consent. In these analyses, exclusion was based on withdrawal of informed consent (n=2) and missing measurements and/or questionnaires (n=1384 / n=1506 at 2 or 5 years of age, respectively). A subgroup of 1488 children remained at 2 years and 1366 at 5 years.

Body mass index (BMI) z-scores were based on age- and gender-specific Dutch reference growth charts of 1997 using Growth Analyser⁹. Overweight was dichotomised based on the z-scores of the cut-offs given by Cole et al.¹⁰. At 2 years of age the children were on average 2.1 years (1.8 to 2.7 years), thus the BMI z-score cut-offs for 2 and 2.5 years were interpolated, resulting in 1.370 for girls and 1.430 for boys. At five years of age the children were on average 5.7 years (4.3 to 6.5 years), therefore BMI z-score cut-offs of 1.036 for girls and 1.206 for boys were used.

In the parent-reported questionnaire at 2 and 5 years the question regarding breakfast frequency was: "How often does your child eat breakfast weekly?" with answer categories 1 to 7 days per week. The answer categories were combined as either "eating breakfast daily" (7 times per week) or "not eating breakfast daily" (< 7 times per week) to increase numbers in the categories.

For longitudinal analysis, skipping breakfast at 2 and 5 years were combined. The categories for this analysis were 1) not skipping breakfast at 2 and 5 years, 2) not skipping breakfast at 2, but skipping breakfast at 5 years, 3) skipping breakfast at 2, but not at 5 years and 4) continued skipping breakfast at 2 and 5 years.

Type of breakfast was defined as 1) bread, 2) cereals or porridge, 3) other, or 4) combination of these, for the cross-sectional association between type of breakfast and overweight at 5 years.

Based on literature and the information available in our dataset, all analyses were adjusted for gender, exact age at 2 and 5 years, birth weight, origin (Dutch or non-Dutch), maternal educational level (low/average or high), maternal and paternal BMI at 2 or 5 years and family type (single-parent family or not). Missing values on covariates (max. 9.8% missing at 2 years and 17.1% at 5 years) were imputed using multiple imputation. All associations were analysed using multivariate logistic regression at 2 and 5 years.

RESULTS

At the age of 2 only 3.0% of the children did not eat breakfast daily, which increased to 5.3% at 5 years (**Table 1**). The prevalence of overweight at 2 years of age was 8.3%, which increased to 13.2% at 5 years.

Skipping breakfast was not associated with overweight at both ages, after adjustment for all confounders (**Table 2**). Unadjusted results were essentially similar (data not shown). Most important factors for skipping breakfast were non-Dutch origin, single-parenting and low/average maternal educational level. Also in the longitudinal approach, no association was found between continuation of skipping breakfast (at 2 and 5 years of age) and overweight at 5 years of age (OR: 0.72 (95% CI: 0.15-3.49)) when compared to not skipping breakfast at 2 and 5 years. The different types of breakfast (bread, cereals/

porridge, other or a combination of these) were also not associated with the risk of overweight (data not shown).

TABLE 1. Characteristics of the children at 2 and 5 years of age.

	2 years (n=1488)	5 years (n=1366)
Overweight child	124 (8.3 %)	180 (13.2 %)
Breakfast skipping	44 (3.0 %)	73 (5.3 %)
Girl	743 (49.9 %)	682 (49.9 %)
Age (years)	2.1 ± 0.00	5.8 ± 0.01
Birth weight (kg)	3.55 ± 0.01	3.55 ± 0.02
BMI mother (before pregnancy)	24.7 ± 0.14	-
BMI mother (at 5 years)	-	25.0 ± 0.14
BMI father (during pregnancy)	25.6 ± 0.11	-
BMI father (at 5 years)	-	25.8 ± 0.09
Dutch origin	1393 (93.6 %)	1275 (93.3 %)
Low/middle educational level mother	938 (63.0%)	835 (61.1%)
Single-parenting	28 (1.9 %)	18 (1.3 %)

Data are shown as mean ± SE or n (%)

Table 2. Associations of childhood characteristics with skipping breakfast and childhood overweight, after adjustment for confounders.

	2 years (n=1488)		5 years (n=1366)	
	Breakfast skipping	Childhood overweight	Breakfast skipping	Childhood overweight
Breakfast skipping	-	1.85 (0.61 – 5.64)	-	0.46 (0.19 – 1.11)
Birth weight	1.30 (0.60 – 2.79)	1.77 (1.08 – 2.91)	1.28 (0.81 – 2.04)	1.71 (1.25 – 2.33)
BMI mother (before pregnancy or at 5 years)	0.99 (0.89 - 1.10)	1.07 (1.02 – 1.13)	1.01 (0.94 - 1.07)	1.10 (1.07 - 1.14)
BMI father (during pregnancy or at 5 years)	1.02 (0.89 - 1.16)	1.08 (1.00 – 1.17)	1.02 (0.94 - 1.11)	1.08 (1.02 - 1.13)
Non-Dutch origin	5.16 (1.72 – 15.45)	0.77 (0.24 – 2.49)	2.69 (1.31 – 5.52)	1.50 (0.78 – 2.87)
Low/middle educational level mother	2.76 (1.02 – 7.44)	1.07 (0.62 – 1.83)	2.91 (1.56 – 5.43)	1.43 (1.00 – 2.04)
Single-parenting	5.03 (1.20 – 21.06)	0.70 (0.09 – 5.57)	2.02 (0.51 – 8.09)	0.91 (0.24 – 3.46)

Multivariate analysis by logistic regression, results are shown as OR (95% CI), reference group is normal weight (incl. underweight) or not skipping breakfast. Analyses are adjusted for exact age, gender, birth weight, maternal BMI, paternal BMI, origin, maternal educational level and single-parenting.

DISCUSSION

Breakfast skipping is rare in 2 and 5 year old children in the Netherlands. Contradictory to our hypothesis, breakfast skipping was not associated with overweight, neither in 2 nor 5 year-olds. As expected, the risk of skipping breakfast was increased in children of non-Dutch origin, mothers with low/middle education and single-parent families.

Comparable to our study, Lioret et al. also did not find an association between skipping breakfast and overweight in 3-11 year old children⁴. On the other hand, most other studies in 4-12 year-olds did find an association between skipping breakfast and overweight¹¹⁻¹³. Several explanations are possible for this inconsistency.

First, age plays a role. Breakfast skipping increases with age^{2,5,14,15} and this is also the case in our data going from 2 to 5 years. However, not skipping breakfast, but other factors could contribute more to the development of overweight in this young age, e.g. parental overweight and birth weight¹⁶. Older children could be more in charge of their own decisions in meal habits¹⁴. Older age could also be related to less family meal times¹⁴. Additionally, older children (especially girls) are shown to be more conscious about their weight, therefore they might skip breakfast to lose weight^{14,17,18}. Since we did not find differences between boys and girls for breakfast skipping and overweight we did not stratify for gender.

Second, the different studies used varying definitions to describe breakfast frequency^{2,15}. In a group of Greek adolescents, the association with overweight differed with varying definitions of skipping breakfast¹⁹. Our definition leads to an estimated 3-5% breakfast skipping, which is in line with previously reported prevalence of 4% in 4-6 year old Dutch children in 1998²⁰. According to Giovannini et al. we propose to define having breakfast as: "The first meal of the day, eaten before or at the start of daily activities, within 2 hours of awaking, typically no later than 10:00 a.m. and of a calorie level between 20% and 30% of total daily energy needs"²¹.

A third explanation could be the use of different cut-off points to define overweight. Nevertheless, Dubois et al. found an association between breakfast skipping and overweight¹², both with overweight based on Cole et al. (14.3%) as well as based on the "US Centres for Disease Control and Prevention"(8.8%). Currently, the discussion on the validity of BMI to assess adiposity in young children gets attention. However, in our

cohort Sijtsma et al.²² concluded that waist-to-height-ratio was not superior to waist-circumference and BMI in association with body fat percentage or cardiometabolic risk.

The lack of an association could also be caused by chance. However, this is less likely since consistent with previous studies, we found that children of non-Dutch origin, of lower educated mothers and of single-parent families skipped breakfast more often^{1,4,5,14}. Also as expected, we found that higher maternal and paternal BMI and birth weight increased the risk for childhood overweight, which is comparable to previous studies²³.

A limitation of this study could be that we did not take into account other dietary habits, besides skipping breakfast, in the association with overweight. Skipping breakfast is a small part of lifestyle and dietary factors that play a role in the development of overweight. We were not able to check the role of daily energy intake or physical activity, because these data were not available. However, analyses on type of breakfast and longitudinal patterns of skipping breakfast showed no associations with overweight at five years either.

One strength of this study is that both weight and height of the children were measured by trained and experienced nurses at the Well Baby Clinics and municipal health services. Since these are objective measurements, the BMI of the children can be reliably interpreted. Another strength is that, to our knowledge, no previous studies about the association between skipping breakfast and overweight in these very young groups of two and five year-olds have been performed.

CONCLUSION

In conclusion, our data do not support the hypothesis that skipping breakfast is associated with childhood overweight in very young children. In contrast to known risk factors, e.g. maternal BMI and birth weight, breakfast skipping is not likely to play an important role in early onset of childhood overweight. At what age to start prevention of overweight by good meal habits is a topic for future research.

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