

# The Finnish Family Competence Study: The effects of living conditions on sucking habits in 3-year-old Finnish children and the association between these habits and dental occlusion

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Sucking habits and their connection with family background was investigated in 3-year-old Finnish children. The association between sucking habits and malocclusion was also studied. The study was based on a survey with stratified randomized cluster sampling, confidential questionnaires, and clinical dental examinations. Dummy (pacifier) use was often associated with a negligent attitude towards the child's toothbrushing. This may imply that these parents need more support, encouragement, and counseling from the well-baby clinic than others. Sucking habits were strongly associated with malocclusion. □ *Dummy-sucking; finger-sucking; family background; malocclusion*

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A child's sucking habits are influenced by the culture in which he or she lives. The initial sucking habit is retained by 60–95% of children (1, 2). The use of a dummy (pacifier) decreases with age, whereas finger-sucking may persist for years. Kerosuo (3) studied dental occlusion in 3- to 8-year-olds in Tanzania and Finland. She found that 10% of the Finnish children had the sucking habit. The African children of Tanzania showed a similar sucking rate, whereas only 4% of the Asian/Arab ethnic group had the habit. Tanzanian children sucked their fingers, and Finnish children used the dummy, finger-sucking being very rare. Few studies have been carried out on the underlying factors of finger- and dummy-sucking habits. Calisti et al. (4) found that the sucking habit was associated with the parents' high socioeconomic status, whereas Larsson & Järveheden (5) found that the parents of finger-sucking children had a higher

level of theoretical education than those of dummy-using children. Some differences (1, 6, 7) have been shown between the Nordic countries in children's sucking habits. In Sweden sucking habits have undergone changes during the last 20 years (8). No epidemiologic data from Finland are available from recent years.

An association of the sucking habit and open bite in deciduous teeth has been shown in several studies (3, 7, 9, 10). There is no agreement on the association of sucking habits and cross-bite in deciduous teeth (9, 11, 12).

The present study was carried out on the sucking habits of first-born children in families from the Province of Turku and Pori and the effects of children's living conditions on these habits. The association of sucking habits, airway obstructions, and malocclusion was also studied. The ultimate aim of the study was to find ways to target more

accurately the prevention of dental disease in all children and to improve the quality of that prevention.

### Subjects and methods

#### Subjects

The present study is part of a project known as The Finnish Family Competence Study, which was launched in 1986 by the Department of Public Health, University of

Turku. The study is a project aimed at improving preventive health care targeted at families. The population sample of the present study was recruited from the Province of Turku and Pori, southwestern Finland, by means of stratified randomized cluster sampling as a representative sample of the whole population of the province. It consisted of all primigravid women in the study area paying their first visit to the public health nurse of the maternity health care clinic (MHCC) on their own initiative in

#### ONSET OF THE FIRST PREGNANCY

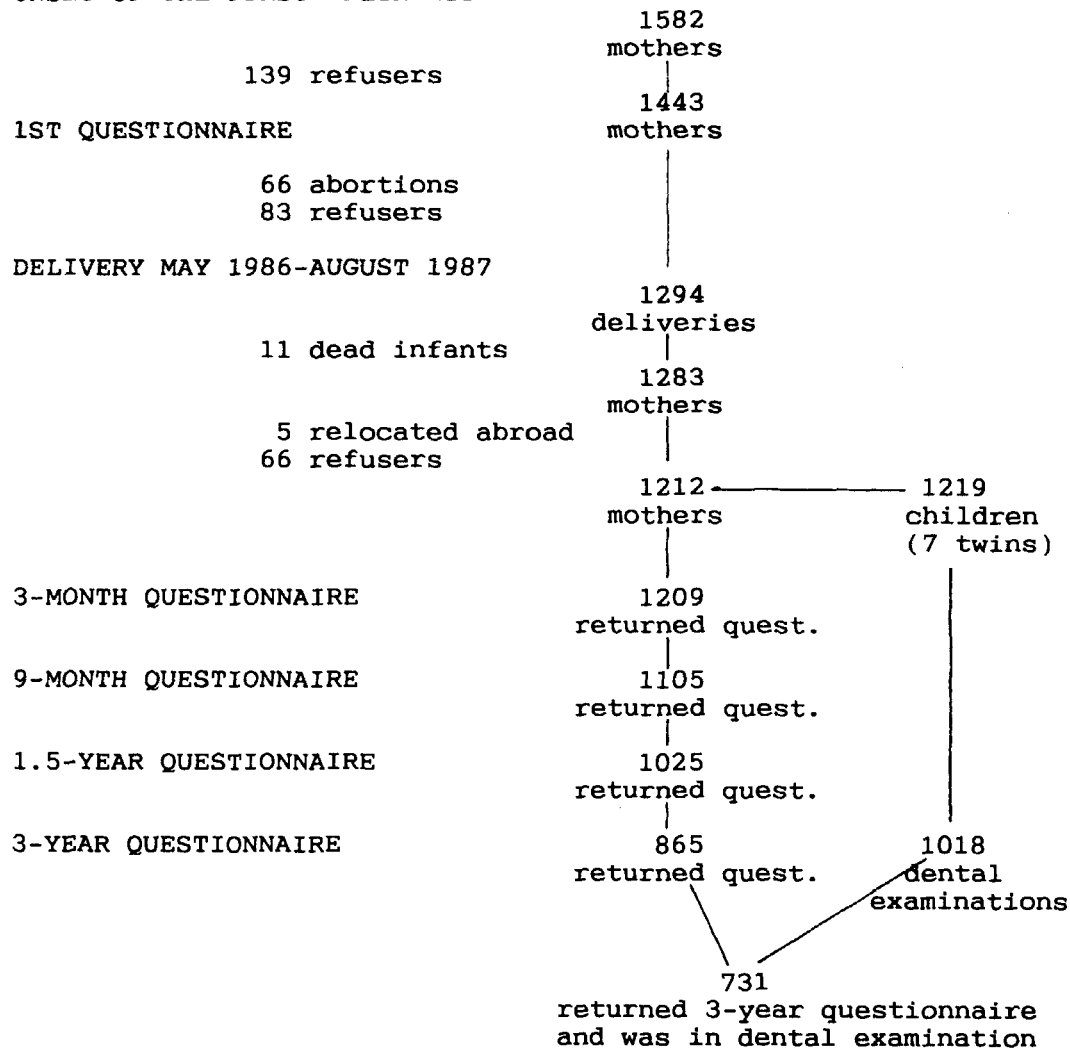


Fig. 1. Study participation chart.

1986. Practically all pregnant women use the services of the MHCCs, which are available free of charge. Eleven health authority areas weighted in accordance with their degree of urbanization were randomly (drawing by lot) chosen for the study. The follow-up of the families was started at the onset of the mother's pregnancy. Structured questionnaires were administered to the mothers, asking about the living conditions of the family and many-sided health-related habits. Fig. 1 shows the participation rates at the various stages of the study. Details of the original study sample have been given elsewhere (13).

### Methods

Of the survey data the following variables were chosen: 1) the mother's socioeconomic background: basic education and occupation (first questionnaire, onset of the pregnancy) (Table 1), age in years at the time of delivery (mean, 25.4 years; range, 16–42 years); 2) the duration of breast-feeding (mean, 7 months) (3-, 9-, and 18-month questionnaire); and 3) factors associated with child care (3-year questionnaire) (Table 1).

The children's teeth were examined at the dental health care clinics of the health districts when they were 3 years old. Examinations were carried out in 1018 of 1219 children (83.5%, 7 twins). The examinees included 515 (50.6%) girls and 503 (49.4%) boys. One of the authors (P. Paunio) personally examined 14.5% of the children. At the examination questions were asked about sucking habits, and notes were made of dental health and of anterior open bite and unilateral cross-bite.

Variables chosen to explain malocclusion included, apart from sucking habits, adenoidectomy and the age of the child when the operation was performed: 0–18 months, 19–24 months, or 25–36 months. The need for the operation was regarded as a sign of airway obstruction.

Of the study participants, 201 did not attend the dental examination. The educational and occupational levels of the drop-out mothers did not differ from those of compliant mothers. The youngest group of

Table 1. Background variables of young families in the Province of Turku and Pori, Finland

Mother's basic education ( <i>n</i> = 1018)	
10 years or more	47.8%
9 years	38.8%
8 years or less	13.4%
Mother's occupation ( <i>n</i> = 1018)	
Professional	54.6%
Service-sector employee	26.4%
Factory employee	10.4%
Primary production and other	8.6%
Marital status ( <i>n</i> = 731)	
First marriage or cohabitation	90.8%
Sole provider	7.6%
Second marriage	1.6%
Siblings ( <i>n</i> = 731)	
No siblings	34.2%
Younger sister or brother	50.9%
Expected	12.2%
A child by a new marriage	2.7%
Daycare ( <i>n</i> = 731)	
At home	53.0%
Full-time	36.4%
Part-time	10.6%
Mother's satisfaction with daycare ( <i>n</i> = 731)	
Perfect	79.4%
Partial	19.5%
Absent	1.1%
Sleeping place ( <i>n</i> = 731)	
Own room	41.1%
Same room as parents	45.1%
Same bed as parents	13.8%
Toothbrushing (child) ( <i>n</i> = 731)	
Daily	78.2%
Occasionally	21.8%

mothers, aged less than 25 years, showed the highest drop-out frequency. The older the mother, the more likely she was to bring her child for the examination (chi-square,  $p = 0.02$ ).

### Statistical methods

The association between responses and potential prognostic factors was assessed by means of the Pearson chi-square test and logistic models (14). Odds ratios (OR) were calculated for statistically significant associations. Confidence intervals (CI) for odds ratios were always 95% intervals. Calculations were made with BMDP statistical software (15).

The study design was approved by the Ethics Committee of the University of Turku, Faculty of Medicine.

## Results

### *Sucking habit*

The sucking habit occurred in 25.1% of the children at the age of 3 years. Dummy users accounted for 23.4% (221 of 944) and finger suckers for 1.7% (16 of 944). The information about sucking habits was missing in 74 cases of 1018 children attending dental examination. More than a half of the dummy users and finger suckers were girls, but the differences were not statistically significant.

### *Dummy sucking*

The older the mother, the greater was the likelihood that the child was using a dummy ( $p = 0.007$ ) at the age of 3 years. An increment of 10 years in the mother's age signified a 1.6-fold risk of dummy use in the child at the age of 3 years (CI, 1.1–2.3). The socioeconomic background of the mother of dummy users did not differ from that of other children. Marital status was not associated with the dummy-sucking habit. Prolonged breast-feeding was associated with a low level of dummy use ( $p < 0.0001$ ). A 6-month difference in the duration of breast-feeding meant in those with a shorter period of breast-feeding an average of 1.7-fold risk of dummy use at the age of 3 years (CI, 1.2–2.3).

The form of the child's day care was significantly associated with dummy use ( $p = 0.02$ ). The lowest frequency of dummy use occurred among children in full-time family day care, and the highest frequency among those cared for by their grandparents. Children whose mothers were unsatisfied with day care were significantly more frequent users of a dummy ( $p = 0.02$ ). The mother's dissatisfaction was not associated with the form of day care ( $p = 0.6$ ). Fifty-six children were cared for by their grandparents. Every third (35.0%) of these children was using a dummy at the age of 3 years, compared with about every fifth child (20.2%) cared for by the mother or someone else. The advent of more children in the family did not explain dummy use in the first-born.

When adjustment was made for the mother's age, the only significant associations of the variables examined were the place of the child's bed and toothbrushing frequency. Sleeping in the parents' room was associated with increased dummy use (OR = 1.6; CI, 1.0–2.3). Children whose teeth were brushed only occasionally used a dummy more frequently than those brushing their teeth every day (OR = 1.6; CI, 1.1–2.5).

### *Finger-sucking*

Finger-sucking occurred in 16 (9 girls and 7 boys) of the 944 children (1.7%) at the age of 3 years. Owing to the low number, their background data were studied in great detail, and their results were not analyzed together with the data of other children. Their mothers' ages did not differ from those of all mothers studied. The educational and occupational levels of these families place them mainly in the lower socioeconomic groups. None of the parents had a university degree (Table 2).

### *Malocclusion and sucking habits*

Malocclusion was found in 35.5% of the 3-year-olds: anterior open bite in 27.2% (255 of 938) and unilateral cross-bite in 8.3% (78 of 938). Both unilateral cross-bite and anterior open bite were seen in 18 children; these children are combined with the cross-bite group. The information about malocclusion was available for 938 of the 1018 children with dental examinations. There was no sex difference. The prevalent sucking habit was associated with both open bite and cross-bite (Table 3).

Both dummy use and finger-sucking were significantly associated with open bite ( $p < 0.0001$ ). The odds ratio for dummy use was 104 (CI, 61.9–174) and for finger-sucking 12.3 (CI, 3.5–43.7). Unilateral cross-bite occurred in 78 children. A dummy was being used by 27 children, and the fingers sucked by 2 children at the age of 3 years. Forty-nine children had no sucking habit at that age. Dummy-sucking was significantly associated with cross-bite ( $p = 0.02$ ) (OR = 1.8; CI, 1.1–3.0), but finger-sucking showed no such association ( $p = 0.6$ ).

Table 2. Percentages of some background variables in finger-suckers ( $n = 16$ ) and all subjects (education and occupation,  $n = 1018$ ; others,  $n = 731$ )

	Finger-suckers, %	Total study population, %
Basic education 10 years or more	43.8	47.8
Occupational: professional	6.3	54.6
First marriage	100.0	90.8
Younger sister or brother	63.1	50.9
Day care at home	62.5	53.0
Own bedroom	31.3	41.1
Daily toothbrushing	71.4	78.2

Thirteen of the 16 finger-suckers had open bite, two had cross-bite, and only one had no malocclusion.

A history of adenoidectomy and the time of the operation was not associated with open bite or cross-bite.

## Discussion

The study sample is highly representative of 3-year-olds in the geographic study area. The proportion of children attending the dental examination (83.5%) was similar to the national rates of children attending dental examinations at this age (82%) (16).

The sucking habits of Finnish 3-year-olds have not shown any great changes over the 2 decades (3, 7, 17). In the present study finger-sucking occurred only in 1.7% of the children, which is in agreement with the results of Järvinen & Lehtinen (7). In Sweden the dummy-sucking habit has been increasing over the last 2 decades, whereas

finger-sucking has become less frequent. However, about 6% of Swedish children retain their finger-sucking habit until the age of 9 years (8). Finger-sucking at 3 years of age is highly uncommon in Finland.

Dummy use satisfies the basic need for sucking (2). The need has decreased by the age of 3, and it can be channeled into other modes of behavior. Those who had been breast-fed for a shorter time had a significantly higher need to suck a dummy at the age of 3 than others who had been breast-fed for a longer time. The latter, however, tended to become finger-suckers.

The older the mother, the greater was the probability that the child was a dummy user. The socioeconomic background of dummy users did not differ from that of the total study population. The sleeping place had a connection with dummy use. Children who slept in a room of their own used a dummy less frequently than those sleeping in the same room with their parents. The child's day care situation was also associated with dummy sucking. Those in full-time day care were the least frequent dummy users. Children in family day care and day care centers are of various ages, which brings pressures to cease dummy use. Dummy use at the age of 3 seems to be a habit encouraged by parents who want to calm down their child. Parental immaturity and lack of child care skills is also reflected in the fact that daily toothbrushing was less frequently supervised in dummy users than in those not using the dummy.

Table 3. Association between sucking habit and malocclusion in 3-year-old children

Sucking habit	$n$	Open bite, %	Cross-bite, %	No mal-occlusion, %	Total, %
Absent	704	5.1	7.0	87.9	100.0
Present	234	83.8	12.4	3.8	100.0
Total	938	27.2	8.3	64.5	100.0

There is no common denominator for finger-suckers. The results, however, clearly show that the educational level of finger-suckers' parents is completely different from that of the populations of Larsson & Järvheden (5). The parents of finger-suckers had a lower level of theoretical education. No specific socioeconomic factors were found to be discriminatory for the finger-sucking habit, but an association was found between successful breast-feeding and finger-sucking.

Open bite was seen in 25% of the children, whereas 16% was the corresponding rate in Järvinen & Lehtinen's (7) study. Holm (6) found a high open-bite rate of 54% in Swedish children. The frequency of cross-bite found in the present study, 8.3%, is in agreement with the results of Järvinen & Lehtinen (7). Cross-bite in Swedish and Danish children has been found to be on the order of 13–17% in deciduous teeth (6, 11, 12). Järvinen & Lehtinen found more malocclusion in girls than in boys, but no sex difference was found in the present study, in agreement with the study of Myllärniemi (9).

In the present study the main interest was the sucking habits themselves at the age of 3. For this reason those who ceased sucking before this age are not included. The study shows a strong association of open bite with dummy- and finger-sucking, as has been shown in several studies (3, 7, 9, 10). Dummy-sucking, unlike finger-sucking, was also associated with cross-bite. Larsson (18) and Lindner & Modeer (19) found that dummy-sucking contributes more than finger-sucking to the initiation of cross-bite in deciduous teeth. Authors do not agree on how much the habit contributes to cross-bite in deciduous teeth. Myllärniemi (9) found no association, whereas Kisling & Krebs (11) and Modeer et al. (12) suggested that in most cases the sucking habit was an underlying factor of cross-bite. In the present study cross-bite occurred in 78 children, and 37% of them had a sucking habit at the age of 3 years. This is in agreement with the results of Holm (6) in 5-year-olds. No association was found between malocclusion and a history of adenoidectomy or the time of the operation. The underlying factors of cross-

bite remain unexplained on the basis of the explanatory variables used.

### Conclusions

The sucking habit at the age of 3 years is strongly associated with dental malocclusion. Dental health care clinics should pay increasing attention to this in their counseling work.

The use of dummy at the age of 3 years may be explained as the parents' way of calming down the child. Dummy use is often associated with negligent supervision of the child's toothbrushing. This may indicate parental immaturity and lack of childcare skills. Well-baby clinics should be prepared to provide more support, encouragement, and counseling to these parents.

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