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The role of parent's Sense of Coherence in irregular meal pattern and food intake pattern of children aged 10-11 in Finland

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Background: Among adults a stronger sense of coherence (SOC) seems to promote a better coping with strain and is associated to healthier behaviours, including eating pattern. The parents' SOC may also have a wider effect on the health behaviour of their children. The aim of study is to determine whether there is associations between parent's SOC and eating patterns of their children and if this can be explained by mediating factors.

Methods: Cross sectional. In 2006, 1,268 (response rate 79 %) ten- and eleven-year-old children in southern Finland, in a classroom situation, filled in a questionnaire assessing meal pattern and food frequency intake. Parents, 816 (response rate 64%), filled in a questionnaire assessing SOC (13-items), and eating patterns. Matching data was found from 772 child-parent pairs. Chi²-tests, factor analysis, univariate analysis of variance and logistic regression analyses were used as statistical methods.

Results: A weaker parental SOC was associated with children's irregular meal pattern ($p=0.004$), more frequent intake of energy rich foods ($p=0.002$), and less frequent intake of nutrient rich foods ($p=0.051$). Mediating factors such as availability and accessibility of fruit and vegetables at home, parent's nutrition knowledge, parent's own fruit and vegetable intake, and an irregular meal pattern explained the association between parent's SOC and children's intake of nutrient dense foods, but not the association with energy rich foods.

Conclusions: Parent's weaker SOC was associated with children's unhealthier eating pattern. More research is needed on the associations between parent's SOC and other health related behaviours of their children.

INTRODUCTION

Determinants of children's dietary intake have been examined in several studies.

According to Davison's ecological model important determinants for both children's dietary intake as for physical activity and sedentary behaviour are family characteristics, parenting style, community, demographic, and societal characteristics.[1] It seems that the family has a very important role in determining children's eating pattern.[2-5]

Having meals together with the family is associated with more frequent fruit and vegetable intake, and having evening meals together in a family setting is associated with less skipping of breakfast.[3, 4, 6] The availability and accessibility of fruits and vegetables at home are associated with children's increased intake of fruits and vegetables.[5] Parents' own fruit and vegetable intake serve as a model, and has been found to be positively associated with their children's intake.[2, 5, 7]

Parental eating patterns, in turn are determined by various factors for instance the parent's educational level is associated both with their own food intake and with their children's food intake.[8, 9] However, there is still a need for greater understanding of how various factors related to both parents and family influence children's eating patterns.

In recent health promotion research, a Salutogenic approach focusing on resources for health, has been brought up in the literature.[10] Antonovsky introduced the Salutogenic area and constructed the sense of coherence (SOC) concept.[11, 12] Antonovsky proposes that a stronger SOC is associated with better capacity to meet both acute and

chronic stressors and better coping.[12, 13] A strong SOC enhances the capacity to appraise the stressor and to use the available resources in an optimal way. This might explain why a stronger SOC among adults has been shown to be associated with good health status, especially mental health.[14] Some studies have also shown that adults' stronger SOC is directly linked to healthier lifestyle behaviours such as more frequent physical activity, less smoking and less frequent use of alcohol.[15-19] A study carried out in Sweden found that a stronger SOC was associated with a more frequent vegetable intake and, among women, also with a more frequent fruit intake; while a lower SOC was associated with a more frequent intake of soft drinks, candies, chips, pizza, hamburgers and sausage.[20] In a study by Wainwright a stronger SOC was, after adjustment for age, social class and education, associated with a higher daily intake of fruit, vegetables and fiber.[18]

The SOC of parents may not only be associated with their own health behaviour but also with the health behaviour of their child. Children's eating patterns might be influenced by parents' SOC since these behaviours are usually shared within families. To our knowledge no study has examined associations between parents' SOC and children's or families' meal pattern and food intake. If there is an association to be found between parent's SOC and children's eating patterns, it is also important to explore possible mediators for this kind of association.

The general objective of this study is to determine whether there exists an association between parent's SOC and eating patterns of children. The research questions are:

1. If there is an association between parent's SOC and children's meal pattern?
2. If there is an association between parent's SOC and children's food intake pattern?
3. If an association between parent's SOC and children's food intake pattern exists, can it be explained by the following mediating factors; parent's role modelling, nutrition knowledge, food availability and accessibility at home, and children having an irregular meal pattern?

METHODS

Material

This study is a part of the school health promotion project 'Hälsoverkstaden' which focuses on the health behaviour of schoolchildren and is conducted by Folkhälsan Research Center, Helsinki, Finland. This study is based on cross-sectional base-line data of schoolchildren aged 10-11 in 31 Finnish Swedish-speaking schools in southern Finland in 2006.

Participants

In autumn 2006, 1,268 children, 618 girls and 650 boys, filled in a questionnaire in a supervised classroom situation; the response rate was 79%. At the same time a parent's questionnaire, was sent home with the children. A total of 816 parents (64%), consisting of 677 mother and 139 fathers, returned a filled-in questionnaire by mail. Matching data was found from 772 child-parent pairs. The matching pairs included 384 girls, 378 boys, (10 missing gender), 642 mothers, and 130 fathers. Of the responded parents 83 % lived

in the same household as the other legal guardian. Both parents and children have signed an informed consent.

Measures

Children's questionnaire

The children answered questions regarding meal pattern, breakfast, lunch and dinner, separately for weekdays and weekends. Questions regarding meal pattern were the same as in the Health Behaviour of School-Age Children study (HBSC).[21] A regular meal pattern consisting of three main meals and one to three intermediate meals is recommended in the Nordic Nutrition Recommendations 2004 in order to avoid snacking.[22] Based on this recommendation a variable for having an irregular meal pattern during week was defined as not having three main meals daily. The variable irregular meal pattern was used as a dichotomy.

Children answered a short food frequency questionnaire, the same instrument used in HBSC, with 16 food items: fruit or berries, fresh vegetables, cooked vegetables, milk, juice, cola or other soft drinks, syrup, hamburgers, hot dogs or meat pastry, pizza, crisps or popcorn, cookies, ice cream, sweets or chocolate, yoghurt, sweetened breakfast cereal or muesli, and dark bread. The foods were scored according to how often they were eaten during one week; never = 0, less than once a week = 0.5, once a week = 1, 2-4 times/week = 3, 5-6 times/week = 5.5, once a day = 7 and several times a day = 14.

Parent's questionnaire

The sense of coherence among parents was measured by the SOC 13-items instrument, comprising of 13 questions, with a response scale for each question ranging from 1 to 7 and the sum score varying from 13 to 91.[12] A higher score means a stronger SOC and therefore SOC was used as a continuous variable.

The parent's questionnaire included questions about having fruit and vegetables *available* at home and easily *accessible* by pre-cutting them into pieces. The answer categories were always, often, sometimes, seldom, and never and the variables were used as ranking variables. *Nutrition knowledge* was measured by two questions; divided into how much fruit and vegetables should be included daily in a healthy diet of a child aged 10-12. **The WHO recommends 400 g daily which is about 5 portions. [23]** Scores from the fruit and the vegetable questions were added to a variable, which was dichotomised into having or not having knowledge about recommendations. Parent's intake as a *model* was measured as how often parent ate fruit and vegetables. The answer categories were: never, less than once a week, once a week, 2-4 days/week, 5-6 days/week, once a day, twice a day, and more than twice a day. The variable was used as a ranking variable.

Parent educational level was measured by asking the highest educational level. The answers were divided into three educational level groups; high school or lower degree (13 % of parents), bachelor degree (45 %), and master degree or higher (42 %).

Statistical analyses

The SPSS version 15 was used for analyses (SPSS Inc., Chicago, IL, USA, 2006). In order to group the children's food intake pattern from the food frequencies we did a Factor analysis, Principal Component Analysis (Table 1). We found two dimensions with eigen values exceeding 1 on which we defined two indices including all food items with a score of 0.5 or more in the rotated component matrix. We named one "Energy Rich Foods"; including *pizza, hamburgers, hot dogs or meat pastry, crisps or popcorn, cookies, ice cream, sweets or chocolate, and cola or other soft drinks*. The other was called "Nutrient Dense Foods" and included *fruit, dark bread, vegetables raw and cooked*. To form the new scores for the two indices, we summed up the weekly consumption scores given for each group of food items.

Table 1. Rotated component matrix *of children's food intake pattern* (children-parents observations $n=772$)

Food	Component	
	Energy rich	Nutrient dense
Fruit and berries	-.06	.68
Vegetables, raw	-.09	.78
Vegetables, cooked	.00	.68
Cola and other soft drinks	.59	-.11
Hamburgers, hot dogs and meat pastry	.73	-.08
Pizza	.67	-.05
Crisps and popcorn	.75	-.02
Cookies	.66	.11
Ice Cream	.66	.10
Sweets and chocolate	.71	-.05
Dark bread	-.06	.65
Eigen value	3.76	2.44

Bold: Figures in bold indicate foods having a value >0.5, which were included in the summary index

The Chi²-test was used to analyse gender differences in the prevalence of irregular meal pattern. The One-way ANOVA was used to analyse gender differences in the food intake pattern.

A logistic regression model was used to examine the association between parent's SOC and children's irregular meal pattern. The dichotomous variable, irregular meal pattern was used as a dependent variable, whereas the continuous variable, parent's SOC, was independent. The result of the logistic regression model is presented as an odds ratio with 95% confidence interval.

The General Linear Model function analysis of variance, UNIANOVA, was used to examine the association between parents' SOC and children's food intake pattern.

Children's food intake pattern of nutrient dense and energy rich foods were used as dependent variables, whereas parent's SOC was used as an independent variable.

Associations of SOC with nutrient dense and energy rich foods were adjusted for *fruit and vegetable availability at home, fruit and vegetable accessibility at home, parent's nutrition knowledge, parent's own intake of fruit and vegetables, all variables together, and an irregular meal pattern*. The beta-coefficient represents the mean frequency of eating nutrient dense or energy rich foods for every added SOC score.

The logistic regression analysis and analysis of variance (UNIANOVA) were adjusted for the educational level of the responding parent and for gender of parent and child. P-values of <0.05 were regarded as the limit for a statistical significant association.

Missing Data

In the analysis we used data from matching parent-child pairs, $n=772$. In both the parent's and children's questionnaire there were unanswered questions. The specific observation was excluded from the analyses if there was missing data which explains the variation of the number of observations in the analyses. In Factor analyses we used data from 772 children, in logistic regression analysis data from 707 parent-child pairs, in analysis of variance for nutrient dense foods data from 712 pairs and for energy rich foods data from 703 pairs.

RESULTS

Meal pattern among children

During weekdays 32% of children reported not having 3 main meals daily, whereas 33% did not have 3 main meals daily during weekends ($n=707$). Twelve percent had an irregular meal pattern during the whole week; no gender differences were found.

Food intake among children

Children ate 18.8 times nutrient dense foods (n=728) during one week and 8.8 times energy rich foods (n=718). No gender differences were found for frequency of eating nutrient dense foods. There was a statistically significant difference between genders in the intake frequency of energy rich foods during a week; girls ate energy rich foods 7.8 times whereas boys ate 9.8 times (p=0.001).

Parent's SOC

The parent's SOC scores ranged from 40 to 90, the mean scores being 71.3 with 95% CI 70.6 to 71.9 (n=772). The gender of the child was of no significance to the SOC scores of parent.

Parent's SOC and an irregular meal pattern among children

Based on the logistic regression analysis a statistically significant inverse association was found for parent's SOC and children's irregular meal pattern (p=0.004). An increase of one SOC score indicated an OR of 0.96 (95% CI 0.94, 0.99) for the child to have a weekly irregular meal pattern. The analysis was adjusted for gender of parent and child, and for the educational level of the parent.

Parent's SOC and children's intake of nutrient dense foods

A statistically significant positive association between parent's SOC and children's intake of nutrient-dense food was found in the analysis (Table 2). A stronger parent's SOC indicated a more frequent intake of nutrient-dense foods during one week. The association disappeared when analyses were adjusted separately for 'having fruit and

vegetables *available, or in an accessible form* at home'. Adjusting separately for 'parent's having more *knowledge* about fruit and vegetable recommendations' made the original association statistically non-significant, as did 'parent's intake of fruit and vegetables as a *role model*'. When adjusting for all the above mentioned variables simultaneously, the statistically significant association disappeared as it did when adjusting for '*an irregular meal pattern*'.

Table 2. Associations between parent's sense of coherence (SOC) and intake of nutrient dense and energy rich foods among children aged 10-11 in Finland in year 2006 (parent-child pairs; nutrient dense n=712, energy rich n=703). Beta-coefficients and 95% confidence intervals of General Linear Models.

Variables included in the model	Nutrient dense		Energy rich	
	B-coefficient (95% CI)*	p-value	B-coefficient (95% CI)*	p-value
SOC	0.10 (0.00, 0.19)	0.051	-0.11 (-0.18, 0.04)	0.002
SOC + availability of fruit and vegetables	0.04 (-0.06, 0.14)	0.423	-0.09 (-0.16, -0.02)	0.012
SOC + accessibility of fruit and vegetables	0.08 (-0.02, 0.18)	0.123	-0.11 (-0.18, -0.04)	0.003
SOC + parent's knowledge about fruit and vegetables recommendations	0.08 (-0.02, 0.18)	0.114	-0.10 (-0.17, 0.03)	0.005
SOC + parent as a role model	0.05 (-0.05, 0.15)	0.334	-0.09 (-0.16, -0.02)	0.016
SOC + availability, accessibility, knowledge and role model	0.01 (-0.1, 0.11)	0.917	-0.08 (-0.15, -0.00)	0.040
SOC and	0.07 (-0.03, 0.17)	0.167	-0.09 (-0.16, -0.02)	0.008

irregular meal
pattern during the
week

* Adjusted for gender of parent and child, and for the educational level of the responding parent

Parent's SOC and children's intake of energy rich foods

A statistically significant negative association between parent's SOC and children's intake of energy-rich foods was found as well (Table 2). A stronger SOC was associated with a less frequent weekly intake of energy-rich foods. Adjusting separately for 'having fruit and vegetables *available or accessible* at home', or for parent 'having more *knowledge* about fruit and vegetable recommendations', for 'parent's intake of fruit and vegetables as a *role model*', for all mentioned variables simultaneously, or for '*an irregular meal pattern*' did not change the statistically significant association between parent's SOC and children's intake of energy-rich foods.

DISCUSSION

Statement of principal findings

This study demonstrated associations between parent's SOC and children's eating patterns. A stronger SOC indicated among children a less irregular meal pattern, a more frequent intake of nutrient dense and a less frequent intake of energy rich foods. The association between parent's SOC and children's intake of nutrient dense food was explained by the following mediators; having fruit and vegetables available and accessible at home, having a better knowledge about recommendations, eating fruit and vegetables as a role model, and having an irregular meal pattern.

Strengths and weaknesses of the study

The parents' and their children's responses were independent of each other, which is a strength of the study design. The children's questionnaire was pre-tested in a class. To our knowledge the meal pattern frequency questions and the short **food frequency questionnaire** have not been validated. The aim of the **food frequency questionnaire** was to get the observations in right sequence according to the frequency of food intake and not according to the amount eaten or to the intake of nutrients. Therefore we believe this measurement can be used even if it is not validated. Generally Riley et al have showed that the reliability of children's self reporting on their health is good as long as the questions are designed for them.[24] Eriksson et al found in their review that the 13-items SOC instrument is relatively valid and reliable compared to the 29-items instrument.[25]

As this is a cross-sectional study we can only explore the association, not the causality. The food choices and the meal pattern of children could possible influence the parent's SOC, but this is less plausible than the reverse association. Since participation was voluntary, the sample might be selective including more parents with a stronger SOC and an interest in health behaviours. Some of the drop-outs among parents might be due to the fact that the children never gave the questionnaire to their parents. A less selective data would probably have shown stronger association than found in this study.

The mean SOC score 71 was quite high, but in line with a study of adults in Swedish speaking Finns at Åland, where the mean was 71.[26] A lower mean score of 65 was found in another study that explored the general population in Finland.[27] An

explanation for the strong SOC in our study could be that a higher proportion of our participants than normally were couples, which was also the case in the study of Åland.[26] In general SOC is stronger among couples than those living alone.[26]

One might argue whether we in this study actually measured parent's health resources or did we measured parent's mental health. In several studies SOC has correlated positively to mental health.[14] To get a more comprehensive understanding of the associations between SOC and eating patterns we need additional studies exploring simultaneously the association between SOC, mental health and eating patterns.

In this study the association between SOC and intake of nutrient dense foods was partly explained by previously reported factors; the availability and accessibility of fruit and vegetables at home, the nutrition knowledge of parent, and parent's own fruit and vegetable intake as a role model.[2, 5, 7] The association between SOC and intake of energy rich foods remained in the model after adjusting for possible mediating factors. The use of other mediating factors related to foods rich in sugar and energy might have explained the association.

Strengths and weaknesses in relation to other studies

Concerning the concept of SOC; comprehensibility, manageability, and meaningfulness in life, and due to a better coping with strain,[12, 13] it seems natural for SOC to be reflected in health behaviours such as family meal patterns including children's meal

pattern. Previous studies have shown that children's meal pattern is connected to the whole family's behaviour.[28]

To our knowledge, there are no other similar studies exploring associations between parent's SOC and their children's eating pattern. We found one study exploring the association between parent's SOC and children's health behaviour, in which a stronger SOC among mothers was associated with better oral health behaviour of their teenagers.[29] Myrin's study, exploring Swedish youth aged 14-15, showed that SOC of the adolescents was associated with the meal pattern.[30] A weaker SOC was associated with a more irregular meal pattern. These results support our assumptions, that stronger SOC either of parents or children is reflected in children's healthier eating patterns.

Implications for clinicians and policy makers

The results of this study implicate that interventions to promote healthier eating among schoolchildren benefit from an awareness of parents' SOC. Parents with a weaker SOC may benefit from interventions aiming to strengthen their SOC and their capability coping with stress, which in turn might have a further impact on healthy lifestyle behaviours of their children such as the availability and accessibility of healthy foods at home and eating patterns.

Unanswered questions and future research

The mediating factors in the study explained some of the examined associations, but not all of them and the factors can at least partly be seen as important pathways connecting

parent's SOC and children's eating behaviour. More research is needed on other mediating factors, including availability and accessibility of energy-rich foods at home. Further studies need to explore associations between parent's SOC and other lifestyle behaviours of their children. Other unanswered questions are whether parent's stronger SOC when children are young can predict later lifestyle behaviour in children, whether the association between parent's SOC and children's health behaviour persists over time, or whether the children's own SOC become a stronger predictor for health behaviour as they grow older. Additionally, interventions meant to strengthen SOC among parents and as an outcome, improve the health behaviour of their children, need further examination.

WHAT THIS PAPER ADDS

What is already known on this subject?

A **sense of coherence** among adults is associated with their own health behaviour such as their eating pattern. An irregular meal pattern and an insufficient intake of fruit and vegetables are common among children. Several family factors have already been related to the eating pattern of children but not parent's **sence of coherence**.

What does this study add?

This study showed an association between a stronger parental **sense of coherence** and children's less irregular meal pattern, more frequent intake of nutrient dense foods, and a less frequent intake of energy rich foods. The association with nutrient dense foods was

mediated by; fruit and vegetables available and accessible at home, parent's knowledge about nutrition recommendations, parent's own eating as a role model and an irregular meal pattern. Health promotion interventions considering parent's **sense of coherence** and aiming to strengthen it, might lead to more favorable eating patterns among children.

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