

Relationship between Childhood Food Experiences and the Use of Restrictions on Consumption of Highly Processed Foods in Adulthood

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Abstract: Consumption of highly processed foods may be determined by social factors, including the family environment. There is still a lack of knowledge on the consumption of highly processed foods in adults in relation to their childhood food experiences. To fill this gap, the aim of the study presented here was to evaluate the relationship between childhood food experiences resulting from parental feeding practices and the use of restrictions on consumption of highly processed foods in adulthood. The cross-sectional study was conducted in 2020/2021 using the CAWI (Computer Assisted Web Interview) method among 702 Polish adults aged 35 and under. The questionnaire included questions from AMoFiC (Adults' Memories of Feeding in Childhood), questions on current use of food restrictions, including highly processed foods, and socio-demographic characteristics. Frequency analysis and cross-tabulations were performed, means and standard deviations were calculated. Pearson's Chi² test and Mann-Whitney's test were used, with an accepted level of significance of $p < 0.05$. About 80% of the study sample declared using restrictions on the consumption of foods, including highly processed foods. The use of restrictions by parents to limit a child's intake of high-fat foods and sweets has shown an association with the use of restrictions in adulthood, including restrictions on the intake of highly processed foods. Low-intensity restriction combined with provision good role models and nutritional knowledge can encourage children to adopt healthy eating behaviors. At the same time, such parental feeding practices may increase the likelihood of reducing consumption of highly processed foods in adulthood.

Keywords: highly processed foods, dietary restrictions, childhood food experiences, adulthood.

Introduction

Sustainable food consumption requires a change in current consumption patterns, including a reduction in the consumption of meat and highly processed foods. Their production poses a serious threat to the environment because of the resources used or the effects accompanying these processes. Restricting or eliminating specific foods from the diet is one of the form of dietary restriction of a qualitative nature (Larson et al., 2002). Dietary restrictions may also be quantitative in nature, i.e. reduction of energy intake (Respondek, 2011). The recommendation to limit the intake of highly processed foods is based on both environmental and health reasons. According to the NOVA food classification, highly/ultra-processed products are of "very low nutritional quality; hyper-palatable and quasi-addictive; imitative of food and falsely seen as healthy; conducive to snacking; aggressively advertised and marketed; and socially and environmentally destructive" (Monteiro et al., 2018). Such foods may also be eliminated from the diet for other reasons, such as by orthorexics who pay obsessive attention to eating foods that are beneficial to health (Mathieu, 2005; Dittfeld et al., 2013).

Consumption of highly processed foods may be notably determined by social factors including but not limited to family (Giovannini et al., 2008). During childhood, children come into contact primarily with people in the family environment, whose involvement in shaping eating behavior can be direct - by providing access to certain foods, and indirect - by shaping attitudes toward food (Jeżewska-Zychowicz, 2000). Social influence can manifest itself through imitation, modeling behavior, and the cult of authority.

Parents interact with their children through the parenting style that can significantly influence the choice of parenting practices used with a child regarding nutrition (Vollmer, 2019). Parents who prefer an authoritative style support and help their child learn about healthy eating, for example by introducing and encouraging the eating of unfamiliar foods. They serve as models for healthy eating and set an example for the child (Shloim et al., 2015; Scaglioni et al., 2018). Parenting style can lead

to high fruit and vegetable intake, higher nutritional value or quality of the diet (Vollmer et al., 2013; Shloim et al., 2015), but also less intake of unhealthy foods, such as sweetened carbonated beverages (Grimm et al., 2004). Parental food choices exert a significant influence on the diets of their children but at the same time children's preferences impact their caregivers' purchasing decisions (Halicka et al., 2021). However, there is a lack of research on the consumption of highly processed foods in adults in relation to their childhood food experiences. Nonetheless, research shows that childhood food experiences may be important in shaping eating styles in adulthood, including the use of restrictions (Puhl et al., 2003).

With this in mind, the aim of the study was to evaluate the association between childhood food experiences resulting from parental feeding practices and the use of restrictions on consumption of highly processed foods in adulthood.

Methodology

The cross-sectional study was conducted between October 2020 and February 2021 using the CAWI (Computer Assisted Web Interview) survey method. Participation in the study was voluntary. Participants provided informed consent to participate in the study. The questionnaire was completed by 778 Polish adults, of which 702 were qualified for the study sample. People aged over 35 were excluded from the analysis due to insufficient numbers of respondents in this group.

Questionnaire

The questionnaire included questions about childhood food experiences resulting from parental feeding practices, current use of dietary restrictions, including those related to consumption of highly processed foods, and questions about socio-demographic characteristics, including gender, age, current and childhood residence, mother's and father's education.

The 39-item AMoFiC (Adults' Memories of Feeding in Childhood) questionnaire developed by Małachowska and Jeżewska-Zychowicz (2021) was used to measure the respondents' food experiences resulted from parental feeding practices. Respondents were asked to report how frequently different situations/family habits took place in their childhood (when they were 7-8 years old), using one of two 6-point scales: 1 – “never”; 2 – “rarely”; 3 – “sometimes”; 4 – “mostly”; 5 – “always”; 6 – „I don't remember” or 1 – “disagree”; 2 – “slightly disagree”; 3 – “neither agree nor disagree”; 4 – “slightly agree”; 5 – agree”; 6 – „I don't remember”, respectively. The answer “I don't remember” has been included to minimize the risk of recall errors.

Behaviors related to consumption of highly processed foods were assessed based on the question "What restrictions do you apply to your food intake?", with the following responses available: I restrict: highly processed products; sweets; high fat products; high sugar products; products containing preservatives, emulsifiers, etc.; other (which?); I do not apply any restrictions. The following coding was used in the analysis: 1/ I limit intake of highly processed products and others, 2/ I limit intake of other products excluding highly processed products, 3/ I do not apply any restrictions.

Statistical analysis

Questions concerning childhood food experiences were assigned to the subscales according to the methodology adopted (Małachowska et al., 2021), and then the Cronbach's alpha reliability coefficient was calculated for each of them (Table 2). The Child Control subscale was excluded from further analyses due to unsatisfactory reliability (Cronbach's alpha <0.7). The response "I don't remember" was considered as missing data. The mean value for each subscale was calculated by summing the scores for each statement from the subscale and then dividing by their number. The resulting scores ranged from 1-5. The higher the score, the more experiences resulted from specific parental feeding practices during childhood.

Frequency analysis and cross-tabulations were performed, means and standard deviations were calculated. Pearson's Chi² test was used, with an accepted level of significance of $p < 0.05$. Mann-Whitney's test was used to compare mean values of each subscale and the use of dietary restrictions in

adulthood. Statistical analysis was conducted using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp, Armonk, NY, USA).

Results and Discussion

Characteristics of the study sample

Characteristics of the study sample are presented in Table 1. The sample consisted of 702 adults, including 428 women and 274 men. Most respondents were 21-24 years old (42%). The mean age was 21.8 years, standard deviation 3.47. Most respondents (43%) now live in large cities (over 250,000 residents). However, in terms of where they lived when they were children, respondents indicated each of the four options in almost equal numbers. Most respondents indicated that their mothers had higher education and their fathers had vocational or primary education, both at 43%.

Table 1

Characteristics of the study sample

Sociodemographic variables		Total	
		Number of respondents (N)	%
Total sample		702	100.0
Gender	Female	428	61.0
	Male	274	39.0
Age	18-20 years old	188	26.8
	21-24 years old	294	41.9
	25-35 years old	220	31.3
Current place of residence	Rural area	127	18.1
	Town with less than 50 000 citizens	118	16.8
	Town with 50 000 – 250 000 citizens	159	22.6
	Town with more than 250 000 citizens	298	42.5
Place of residence in childhood	Rural area	194	27.6
	Town with less than 50 000 citizens	173	24.6
	Town with 50 000 – 250 000 citizens	176	25.2
	Town with more than 250 000 citizens	159	22.6
Mother's education	Vocational or primary	176	25.1
	Secondary	222	31.6
	High	304	43.3
Father's education	Vocational or primary	299	42.6
	Secondary	193	27.5
	High	210	29.9

Childhood food experiences resulting from parental feeding practices

Childhood food experiences most resulted from the parental food practices representing "Healthy eating guidance" (mean value 3.6), followed by "Monitoring" (3.0) and "Pressure and food reward" (2.9). Practices associated with the use of various restrictions towards the child occurred the least frequently (2.0), i.e., answer "rarely" or "slightly" on the scale – Table 2.

Table 2

Subscales and items included in Adults' Memories of Feeding in Childhood (AMoFiC) questionnaire

Subscales and items	Mean ¹⁾ ; SD ²⁾	N Cronbach's alpha Mean ¹⁾ ; SD ²⁾
Restrictions		
My parents took care of me not eating too many high-fat foods	2.7; 1.23	N = 454 0.783 2.0; 0.70
My parents encouraged me to eat less so I won't get fat	2.0; 1.37	
My parents gave me small helpings of food to control my body weight	1.7; 1.07	
My parents discussed with me the nutritional value of foods	2.1; 1.28	
If I ate more at one meal, parents have tried to decrease my food helpings at the next meal	1.5; 0.91	
My parents restricted the foods that would possibly make me gain weight	2.3; 1.36	
My parents believed that there are certain foods that I should not consume to prevent weight gain	2.4; 1.46	
My parents limited sweets/desserts for me in response to bad behavior	2.3; 1.42	
My parents wanted to be sure that I do not eat too much of my favorite foods	2.3; 1.20	
My parents did not allow me to eat between meals because they didn't want me to gain weight	1.8; 1.14	
My parents told me what I can and cannot eat without any explanation (R ³⁾)	1.9; 1.25	
My parents have often put me on a diet to control my weight	1.3; 0.84	
My parents shown me how much they enjoy 'healthy eating'	2.6; 1.33	
Healthy Eating Guidance		
Most of the foods that my parents kept in the house were 'healthy'	3.3; 1.17	N = 569 0.834 3.6; 0.92
My parents involved me in planning family meals	3.0; 1.42	
My parents allowed me to help prepare family meals	4.0; 1.29	
As a child, I had an access to many 'healthy foods' at each meal	3.8; 1.14	
My parents encouraged me to try new foods	4.2; 1.08	
My parents told me that 'healthy food' tastes good	3.7; 1.34	
My parents encouraged me to participate in grocery shopping	3.8; 1.27	
My parents encouraged me to eat a variety of foods	4.1; 1.05	
My parents modelled healthy eating for me by eating healthy foods themselves	2.6; 1.32	
Pressure and Food Reward		
My parents always insisted on finishing everything I had on the plate	2.9; 1.46	N = 564 0.714 2.9; 0.92
My parents offered me my favorite foods in exchange for good behavior	2.7; 1.44	
My parents offered me sweets as a reward for good behavior	2.6; 1.40	
My parents insisted that I eat even though I told them that I'm not hungry	2.8; 1.50	
If I ate a small helping, my parents tried to get me to eat more	3.5; 1.33	
After finishing a meal, my parents tried to get me to eat more, even a bite of food	2.7; 1.45	
Monitoring		
Did your parents pay attention to the sweets that you were eating as a child?	3.1; 1.16	N = 576 0.836 3.0; 0.98
Did your parents pay attention to the salty snacks that you were eating as a child?	3.1; 1.19	
Did your parents pay attention to the high-fat foods that you were eating as a child?	2.5; 1.19	

Did your parents pay attention to the sugary drinks that you were drinking as a child?	3.2; 1.35	
Did your parents encourage you to eat healthy foods before unhealthy ones?	3.0; 1.39	
Child Control		
Did your parents let you consume everything you wanted?	3.4; 1.11	N = 513 0.591 3.0; 0.71
Did your parents let you choose the foods you wanted from what was being served for dinner?	2.5; 1.41	
Did your parents give you something to eat or drink as a first thing when you got fussy?	2.1; 1.05	
Did your parents make something else when you did not like what was being served?	2.9; 1.29	
Did you have an access to snacks throughout the day?	3.6; 1.20	
Did your parents allow you to leave the table when you were full even when the rest of the family was not done eating?	3.7; 1.35	

¹⁾Mean value based on the 5-point scales: 1- “never”/”disagree”; 2- “rarely”/”slightly disagree”; 3- “sometimes”/”neither agree nor disagree”; 4- “mostly”/”slightly agree”; 5- “always”/”agree”;

²⁾SD - standard deviation; ³⁾R – scores were reverse coded.

The use of food restrictions in adulthood

Over 40% of the survey sample (41.9%) reported using restrictions on eating highly processed foods, and slightly less 38.2% reported using other restrictions. Thus, one in five did not apply any restrictions (Table 3). Significantly more women (50.2%) than men (28.8%) followed restrictions on eating highly processed foods, also more people whose fathers had at most vocational education (45.2%) or higher education (46.2%) than people whose fathers had secondary education (32.1%). An inverse relationship was observed in the case of restrictions on the consumption of foods other than processed foods. They were applied by more men than women and by more persons whose fathers had secondary education. Place of residence, both current and in childhood, age and mother's education did not differentiate the declarations regarding the use of food restrictions.

Table 3

Use of food restrictions with consideration of socio-demographic characteristics (%)

Sociodemographic characteristics		Restrictions on eating:		
		highly processed food and others	other than highly processed food	without restrictions
Total sample		41.9	38.2	19.9
Gender (p<0.001)	Female	50.2	35.0	14.7
	Male	28.8	43.1	28.1
Current place of residence (p=0.931)	Rural area	44.6	36.2	19.1
	Town < 50 000 citizens	39.6	39.6	20.8
	Town with 50 000–250 000 citizens	41.5	38.1	20.3
	Town > 250 000 citizens	38.6	40.9	20.5
Place of residence in childhood (p=0.231)	Rural area	42.8	39.7	17.5
	Town < 50 000 citizens	48.0	34.7	17.3
	Town with 50 000 – 250 000 citizens	42.1	36.9	21.0
	Town > 250 000 citizens	34.0	41.5	24.5
Age (p=0.079)	18-22 years old	34.6	40.4	25.0
	23-30 years old	42.5	39.5	18.0
	31-55 years old	47.3	34.5	18.2

Mother's education (p=0.409)	Vocational or primary	45.5	37.5	17.0
	Secondary	36.9	40.6	22.5
	High	43.5	36.8	19.7
Father's education (p=0.027)	Vocational or primary	45.2	36.7	18.1
	Secondary	32.1	43.0	24.9
	High	46.2	35.7	18.1

Results showing frequent use of restrictions are confirmed by other studies as well (Bernstein et al., 2010). Among other than highly processed food, there were foods produced with the use of advanced technologies. Such foods are also often characterized by a high degree of processing (i.e. sweets, high fat products; high sugar products; products containing preservatives, emulsifiers, etc.). Nevertheless, the attention paid to the production process in the name of the food ("highly processed") was intended to highlight the production method as significantly interfering with both the final form of the product and the environment.

Only childhood eating experiences related to parental use of various restrictions on the child differentiated the use of eating restrictions in adulthood. Those who currently follow restrictions on their food intake, both highly processed and other foods, scored higher on the Restrictions scale compared to those not using any restrictions (Table 4).

Table 4

Use of food restrictions in accordance to childhood experiences (%)

Subscales	Restrictions on eating:		
	highly processed food and others	other than highly processed food	without restrictions
Restrictions	2.1 ^a ; 0.75	2.0 ^a ; 0.69	1.8 ^b ; 0.60
Healthy Eating Guidance	3.6 ^a ; 0.90	3.6 ^a ; 0.77	3.6 ^a ; 0.70
Pressure and Food Reward	2.9 ^a ; 0.90	2.8 ^a ; 0.82	2.9 ^a ; 0.97
Monitoring	3.0 ^a ; 1.05	3.1 ^a ; 0.94	2.9 ^a ; 0.92

^{a,b} Different superscripts indicate significantly different means following Mann-Whitney's test

A higher score on Restrictions subscale was associated with the presence of restrictions in adulthood, both on highly processed foods and on other foods. Restrictions in childhood (regarding high-fat foods, foods making gain weight, sweets, snacking and large portions of food) can therefore be considered as learned practices applied in adulthood that may protect against excessive consumption, including high-energy and highly processed foods. However, the study did not assess current food consumption, so confirmation of this assumption requires further research.

However, among the 13 items from the Restrictions subscale there are also statements describing parents' educational activities (discussion on the nutritional value of foods and information on foods that may be eaten) and a statement on the modelling effect (showing ways to enjoy "healthy eating"). Research among children shows that modelling their diets through behaviors such as increasing the availability of adequate foods or limiting unhealthy foods was positively related to healthy eating behaviors such as high fruit and vegetable consumption and negatively correlated with consumption of high-sugar beverages, salty snacks as well as sweets. Children of parents who emphasize nutrition education, encourage dietary diversity and model eating behaviors, as well as involve the child in food-related activities (e.g. food choice, meal preparation) were characterized by favorable eating behaviors (Warkentin et al., 2016). Our results indicate that the use of restrictions, combined with the provision of nutritional knowledge as well as modelling, can be considered a predictor of using food restriction in adulthood, including highly processed foods. Although the use of restrictions in childhood was described as rare, their effect in adulthood was confirmed.

Research to date suggests that practices inducing the child to consume particular foods had an impact on reducing their consumption, as well as increasing aversion to them (Frankel et al., 2012). When children experience restricted access to food, they display increased intake when restrictions are lifted

(Tapper, 2017). In addition, research suggests (Birch et al., 2003) that high levels of dietary restriction aimed at controlling child weight have the effect of reducing self-regulation in eating, which may indirectly contribute to increased food intake and consequently excessive body weight. A number of studies (Birch et al., 2003; Gregory et al., 2010) also indicate that children exposed to high levels of restriction tended to exhibit adverse eating behaviors such as emotional eating, reduced fruit and vegetable intake and higher frequency of salty snack consumption. Thus, restrictive practices cannot be recommended to parents as effective in counteracting high consumption of certain foods in adulthood. On the other hand, the results of our study suggest that low-intensity of restrictive practices accompanied by parental modelling of children's behavior by providing correct role models and adequate knowledge may be conducive to limiting the intake of highly processed foods in adulthood.

No association was found between the use of dietary restrictions in adulthood and childhood experiences as a result of parental feeding practices included in the Healthy Eating Guidance and Pressure and Food Reward subscales. Previous research suggests that greater intensity of these latter practices might favor higher intake of sweets and salty snacks. Moreover, forced consumption in response to fussy eating may persist into adulthood, leading to lower intake of favorable foods and higher intake of unfavorable foods (Ellis et al., 2016; Batsell et al., 2002). But it has also been shown that monitoring a child's behavior was associated with higher consumption of fresh fruit and vegetables (Warkentin et al., 2016).

The study has some limitations, including the fact that it relies on retrospective self-reports that may have been biased, for example by imprecise recollections (Williams et al., 2017). Moreover, the cross-sectional design of this study does not allow to find a causal relationship. The data were collected among Polish adults, hence the results cannot be generalized to other populations due to differences related to ethnicity or socioeconomic status. The study is also limited by the low age diversity of the study group.

Conclusions

The survey in Polish young adults found that:

- Approximately 80% of the study sample declared using restrictions on the consumption of foods, including highly processed foods.
- Parents' using restrictions to limit a child's food intake of high-fat foods and sweets showed an association with the use of restrictions in adulthood, including restrictions on highly processed foods intake.
- Low intensity restrictions combined with modelling of child behavior (e.g. providing good role models or nutritional knowledge) should be used by parents to encourage healthy eating behavior in their children. At the same time, such parenting feeding practices may increase the likelihood of limiting the consumption of highly processed foods in adulthood.

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