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Original

Eating style, television viewing and snacking in pre-adolescent children

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Abstract

Introduction: Television viewing is considered to be a risk factor for overweight in children because of its association with reduced physical activity and increased calorie intake.

Objective: The aim of the present study is to examine whether eating styles affect the relationship between television viewing (TV-viewing) and snacking.

Method: In a sample of 962 pre-adolescents, self-reported television viewing and snacking were assessed in relation to dietary restraint, external eating and emotional eating, as measured with the child version of the Dutch Eating Behavior Questionnaire. With regression analyses we assessed the possible moderating role of emotional, external and restrained eating on the relation between TV-viewing and snacking. In all analyses we controlled for age, sex, BMI and the possible confounding effects of the other eating styles.

Results: Emotional eating, and not dietary restraint or external eating, moderated the relationship between TV-viewing and snacking.

Conclusion: TV-viewing seems to be more strongly related to snacking in children with higher levels of emotional eating. TV-viewing may also be a risk factor for the development of emotional eating.

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Key words: Children. DEBQ-C. Dietary restraint. Emotional eating. External eating. Television viewing. Snacking.

Abbreviations

BMI: Body Mass Index.

cm: Centimetre.

DEBQ-C: Dutch Eating Behaviour Questionnaire-Child version.

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ESTILOS DE INGESTA, VER LA TELEVISIÓN Y PICAR COMIDA EN NIÑOS PREADOLESCENTES

Resumen

Introducción: Ver la televisión se considera como un factor de riesgo de sobrepeso en niños, debido a su asociación con menores niveles de actividad física y a un aumento de la ingesta de calorías.

Objetivo: El objetivo del presente estudio es analizar si los estilos de ingesta están afectando a la relación entre ver televisión (TV-ver) y el picar comida.

Método: En una muestra de 962 preadolescentes, se midieron los hábitos de televisión y de picar comida en relación con restricción dietética, comer externo y comer emocional, medido con la versión para niños del Cuestionario Holandés de Comportamiento Alimentario. Mediante análisis de regresión se evaluó el posible papel moderador del comer emocional, externo y restrictivo en la relación entre ver la televisión y picar comida. En todos los análisis se controló la edad, sexo, índice de masa corporal y los posibles efectos de interacción con otros estilos de comer.

Resultados: El comer emocional, y no la restricción dietética o comer externo, moderó la relación entre ver la televisión y picar comida.

Conclusión: Ver la televisión parece estar más estrechamente relacionados con picar comida en niños con niveles más altos de comer emocional. Ver la televisión puede ser también un factor de riesgo para el desarrollo del comer emocional.

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Palabras clave: Niños. DEBQ-C. Restricción dietética. Comer emocional. Comer externo. Ver televisión. Picar comida.

DVD: Digital Versatile Disc.

kg: kilogram.

SD: Standard Deviation.

SPSS: Statistical Package for the Social Sciences.

TV-viewing: Television viewing.

Introduction

Television viewing (TV-viewing) is considered to be a risk factor for overweight in children because of its association with reduced physical activity and increased calorie intake.^{1,2} Indeed, increased TV-viewing has been associated with both a higher intake of sweet and

salty snacks, and with nutritionally poorer diets in children.³

In the explanation of the relationship between TV-viewing and increased intake of energy, one line of research has focused on the link between food advertisements and the preference and intake of food. Indeed, food is the most frequently advertised product category in children's TV programmes.^{4,5} Advertisements have been shown to affect food preferences in preschool children,^{6,7} to affect actual food intake in schoolchildren⁵ and are therefore thought to be one factor explaining the recent increase in obesity in children. Children with a high tendency toward external eating may be more vulnerable to the effects of food advertisements on TV, but, to our knowledge, this has not been investigated yet.

Another line of research has focused on the relationship between food intake and exposure to thin body images in the mass media. Increased body dissatisfaction (especially in pre-college participants and in those with the dietary restraint eating style)^{8,9} has been associated with viewing these images of thin bodies and has also been linked to overeating when the cognitive resolve to eat less is abandoned¹⁰. Indeed, watching diet commercials/thin images has been associated in some studies with overeating in female adults characterized as "highly restrained" eaters^{11,12,13} (but see¹⁴ who did not replicate this finding). Thin body images on TV have also been considered as a possible explanatory factor for the increase in obesity in children, one can expect that viewing thin models leads to strict dietary restraint, which, when it fails, can lead to a large food intake.

An alternative explanation may be the association between TV-viewing and negative mood, including the negative emotions of guilt, loneliness and depression. While the most common reaction to negative moods is to eat less¹⁷, some people (often labelled 'emotional' eaters) actually eat more. A relationship between TV-viewing and increased food intake (found in adults and adolescents who are emotional eaters^{15,16}) might also be expected in children who are emotional eaters.

Snoek et al.¹⁸ investigated whether the three eating styles (external, restrained and emotional eating) moderated the positive relationship between TV-viewing and snacking in adolescents. External eating in boys and girls, and emotional eating in boys appeared to enhance the positive relation between TV-viewing and snacking. However, the positive relation between TV-viewing and snacking was attenuated in the adolescents with high dietary restraint. In that study only the individual effect of the eating styles was investigated, without correcting for the other eating styles. However, there is evidence that emotional and external eating often co-occur and that people may try to counteract these eating styles by cognitive restriction of their food intake^{19,20}.

The present study examined whether eating styles moderate the relationship between television viewing

(TV-viewing) and snacking. Three main types of eating style were explored, namely external eating (eating in response to external food cues, such as seeing of food), dietary restraint (eating less than desired to maintain or lose weight) and emotional eating (eating in response to negative emotions). The aim of the present study was to examine the impact of each of the three eating styles as possible moderator variables on the relationship between TV-viewing and snacking in children. We expected, in a sample of pre-adolescents (children aged 7 to 12 years), to replicate the earlier findings of Snoek et al.,¹⁸ in that both emotional and external eating will enhance the relationship between TV-viewing and snacking and that dietary restraint will attenuate this relationship.

Method

Participants

Nine hundred sixty-two pre-adolescent children, 476 boys and 486 girls, with a mean age of 9.5 years (SD = 1.5) and ages ranging from 7 years (n = 83) to 12 years (n = 104) took part in this study. The participants attended ten different schools in the eastern part of the Netherlands. Body Mass Index (BMI, i.e. weight/ height * height) was calculated based on height and weight measured by the researcher. Weight was measured in light clothing and without shoes, to the nearest of 0.1 kg. Height was also measured according to standard procedures (without shoes and hair decorations), to the nearest of 0.5 cm. To determine whether a child was overweight or obese international cut-off scores²¹ were used. These cut-off points are age- and sex-specific and based on curves that reach BMI scores of 25 and 30 at the age of 18. Scores higher than the first curve (BMI at age 18 = 25) were considered overweight. Scores higher than the second curve (BMI at age 18 = 30) were considered obese. Also an underweight group was specified, based on scores that reach BMI scores under 18 at the age of 18. Thus all scores above the BMI = 18 but under the BMI = 25 curve were nominated "normal body weight". A total of 6% of the children had an underweight status; 78.7% had a normal weight status; 13.5% were overweight and 1.8% was obese. The percentages obtained for overweight and obese children were a little lower in this sample than those measured in 2002-2004²² in the general Dutch population of children aged 7 to 12 (overweight: 14-24.6%; obesity: 2.3-6.5%).

Instruments

The DEBQ-C,²⁴ an age-adapted 20-item version of the Dutch Eating Behaviour Questionnaire,²³ which is suitable for 7 to 12 year old children,²⁴ was used to

measure emotional, external and restrained eating behaviors. The items had a three choice response format: “no” (score 1), “sometimes” (score 2) or “yes” (score 3). The scales had satisfactory factorial validity and adequate correlations with other measures such as frequency of consumption of snacks.²³ Cronbach’s alpha for emotional, external and restrained eating in the present sample of children was 0.73, 0.71 and 0.74, respectively. These alpha’s are highly similar to those obtained in a Spanish validation study of the DEBQ-C.²⁵

Snacking was measured with two questions, consumption of sweet and/or savoury snacks in the last week (response categories: never [1], one day a week [2], two days a week up to every day [3 up to 8]) and the amount of sweet and/or savoury snacks consumed per day during the last week (response categories: never [1], one piece a day [2], two pieces a day [3], three up to five pieces or more a day [4 up to 6]). Responses on the two questions on snacking were combined (snack-days per week * amount of snacks per day) into a new variable which is labelled ‘snacking’, a measure of the total number of snacks the child usually ate per week. Television viewing on a regular school day (including videos and DVDs) was rated on a four-point scale (< 30 minutes [1]; 30 minutes - one hour [2], one to two hours [3]; more than two hours [4]).

Procedure

Parental consent to participate in this study was obtained for all children. The Dutch law on scientific research in human participants states that research in children is not allowed except for when the study cannot be conducted in adults. This is the case for the present study, because the aim of the study was to examine the impact of each of the three eating styles on the relationship between TV-viewing and snacking, specifically in children. If the investigation has minimal risks and minimal burden for the children, parental consent is sufficient. Both the risks and the burden of this paper and pencil questionnaires were estimated as minimal, and throughout this research we took great care to follow the Dutch ethical guidelines on scientific research on human participants.²⁶ The questionnaires were administered under the supervision of both a teacher of the school and a researcher. The researcher encouraged questions in order to ensure that the children understood the meaning of each item. Furthermore, the researcher read each question out loud to the youngest children (7 year olds) and gave examples only when necessary. It is unlikely that this affected the outcome of the study because highly similar results were obtained in the subsamples of children of eight years and older and the same held true for the subsample of nine years and older. After completing the questionnaire, each child was taken out of the class to a separate room

where his/her body weight and height was measured by the researcher.

Data analysis

All variables were observed for skewness and no problems were observed, except for emotional eating, which showed a skewness of 1.9. After log transformation, skewness ceased to be a problem. However, because in the analyses highly similar results with transformed and untransformed scores were obtained, only the results with the untransformed scores are shown.

Next, descriptive analyses were conducted to gather information about the means, standard deviations and inter-correlations of the variables at study. Three hierarchical regression analyses were performed with snacking as the dependent variable, in order to investigate the moderation of the eating styles on the relationship between TV-viewing and snacking. In the first steps age, sex and BMI were entered to correct for their possible confounding effects. In the second step the other two eating types were entered to correct for their interrelations between the three eating styles. In the third step the eating style of interest was entered. Finally, the interaction of the eating style of interest with TV-viewing was entered in the fourth step. To determine the separate moderator effects of the three eating styles, a fourth hierarchical regression analysis was conducted that examined the simultaneous impact of the three eating styles as possible moderator variables on the relation between TV-viewing and snacking.

To facilitate interpretation of interactions and reduce problematic collinearity between main effects and interaction terms, all variables were mean-deviated or centered (i.e. the overall mean was subtracted from the values of a variable) prior to the regression analysis.^{27,28} An alpha level of 0.05 was used for all statistical tests. All analyses were performed with SPSS 15.0.

Results

A total of 24% of the children watched TV less than 30 minutes a day, 33.1% watched TV between 30 minutes and one hour, 26.4% between one and two hours and 16.5% watched TV more than two hours a day. TV-viewing was positively associated with snacking, external eating and emotional eating, but it was not associated with BMI (table I) or BMI level ($p > 0.10$; not shown in table I). This result held when the BMI levels were re-coded into two categories, i.e. normal weight (including the BMI levels underweight and normal weight) and overweight (including the BMI levels overweight and obese; $p > 0.10$; also not shown in table I). There were significant positive correlations between dietary restraint and BMI and between emotional eating and external eating.

Table I
Pearson correlations, means and standard deviations

	1	2	3	4	5	6
1 Snacking						
2 TV-viewing	0.18**					
3 DEBQ-Restraint	-0.13**	-0.03				
4 DEBQ-external eating	0.29**	0.09**	-0.06			
5 DEBQ-emotional eating	0.13**	0.06**	0.05	0.41**		
6 Body Mass Index	-0.13**	0.02	0.27**	-0.19**	-0.14**	
Mean	9.28	2.34	1.56	1.97	1.22	17.27
Sd	8.47	1.01	0.45	0.45	0.30	2.51

**p < 0.01.

Table II
Result of the four hierarchical regression analyses. Effects of individual and joint moderators on the relation between TV-viewing and snacking

Step		B	SE	Beta	p
1	Intercept snacking	19.657	2.416		< 0.001
	age	-0.269	0.166	-0.047	0.155
	sex	-0.868	0.543	-0.051	0.110
	Body Mass Index	-0.377	0.111	-0.112	< 0.01
<i>Regression analysis 1: Moderator effect of dietary restraint</i>					
2	DEBQ-external eating	5.207	0.660	0.276	< 0.001
	DEBQ-emotional eating	0.364	0.975	0.013	0.709
3	TV-viewing	1.308	0.256	0.157	< 0.001
	DEBQ-restraint	-1.770	0.614	-0.084	< 0.01
4	TV-viewing x DEBQ-restraint	-0.406	0.585	-0.021	0.488
<i>Regression analysis 2: Moderator effect of external eating</i>					
2	DEBQ-restraint	-2.243	0.637	-0.118	< 0.001
	DEBQ-emotional eating	3.194	0.937	0.112	< 0.01
3	TV-viewing	1.308	0.256	0.157	< 0.001
	DEBQ-external eating	4.665	0.655	0.247	< 0.001
4	TV-viewing x DEBQ-external eating	-0.173	0.552	-0.010	0.753
<i>Regression analysis 3: Moderator effect of emotional eating</i>					
2	DEBQ-restraint	-1.759	0.620	-0.093	< 0.01
	DEBQ-external eating	5.160	0.618	0.273	< 0.001
3	TV-viewing	1.308	0.256	0.157	< 0.001
	DEBQ-emotional eating	0.315	0.963	0.011	0.743
4	TV-viewing x DEBQ-emotional eating	1.777	0.756	0.072	< 0.05
<i>Regression analysis 4: Joint moderator effects of dietary restraint, external and emotional eating</i>					
2	TV-viewing	1.308	0.256	0.157	< 0.001
	DEBQ-restraint	-0.770	0.613	-0.094	0.004
	DEBQ-external eating	4.665	0.656	0.247	< 0.001
	DEBQ-emotional eating	0.315	0.963	0.011	0.743
3	TV-viewing x DEBQ-restraint	-0.533	0.586	-0.028	0.363
	TV-viewing x DEBQ-external eating	-0.816	0.596	-0.045	0.171
	TV-viewing x DEBQ-emotional eating	2.226	0.817	0.090	0.007

Moderator effects of dietary restraint, external and emotional eating

Table II shows the results of the four hierarchical regression analyses. The first step was identical for all analyses and showed that BMI appeared to contribute significantly to snacking: the higher the BMI the lower the snacking. Age and sex did not contribute significantly to snacking.

In the first regression analysis with *dietary restraint* as the moderator variable, external eating, when controlling for emotional eating at step 2, was related to higher levels of snacking, but there was no main effect for emotional eating when controlling for external eating. More TV-viewing was also significantly related to higher levels of snacking, whereas dietary restraint was significantly related to lower levels of snacking (step 3). The relation between TV-viewing and snacking was not significantly moderated by dietary restraint (step 4).

In the second regression analysis with *external eating* as moderator variable, dietary restraint, when controlling for emotional eating at step 2 was related to lower levels of snacking, and emotional eating, when controlling for dietary restraint, was related to higher levels of snacking. Both TV-viewing and external were significantly related to higher levels of snacking (step 3) and the relation between TV-viewing and snacking was not significantly moderated by external eating (step 4).

In the third regression analysis with *emotional eating* as moderator variable, dietary restraint was related to lower levels of snacking and external eating and TV-viewing were both significantly related to higher levels of snacking (steps 2 and 3). There was no main effect on snacking for emotional eating (step 3) but the relationship between TV-viewing and snacking was significantly moderated by emotional eating (step 4).

Following the procedure recommended by Holmbeck,²⁹ post hoc analyses were conducted to determine the nature of the significant interaction between TV-viewing and snacking. Results of the regression analysis for high emotional eating indicated that TV-

viewing was significantly associated with snacking ($B = 1.777, p < 0.01$). In contrast, results of the regression analysis for low emotional eating indicated that TV-viewing was also significantly associated with snacking ($B = 0.723, p < 0.05$). Regression lines depicting raw TV-viewing scores for high and low emotional eating are plotted in figure 1.

Table II also shows the results of the fourth hierarchical regression analysis that examined the simultaneous impact of the three eating styles as possible moderator variables on the relation between TV-viewing and snacking. Again, TV-viewing and external eating were significantly related to higher levels of snacking, dietary restraint to lower levels of snacking and emotional eating was not directly related to snacking. Further, emotional eating significantly moderated the relation between TV-viewing and snacking, whereas dietary restraint and external eating did not.

Discussion

The current research examined individual and joint moderator effects of three eating styles (dietary restraint, external and emotional eating) on the relationship between TV-viewing and snacking, in a large sample of preadolescent children aged between 7 and 12 years. More TV-viewing was significantly related to more snacking. On the other hand, the relationship between BMI and snacking was negative, that is, the higher the BMI the lower the snacking. With regard to the different eating styles, dietary restraint was related to lower levels of snacking, whereas external was significantly related to higher levels of snacking. More importantly, only emotional eating acted as a moderator variable on the relationship between TV-viewing and snacking, and it remained significant even when the simultaneous impact of the other eating styles as possible moderator variables was examined. TV-viewing seems to be more strongly related to snacking in children with higher than with lower levels of emotional eating.

The finding that external eating did not moderate the relationship between TV-viewing and snacking does not correspond with earlier findings where external eating was shown to significantly moderate the relation between food advertisement and food intake in children^{5,6,7} Also the finding that restrained eating did not moderate the relationship between TV-viewing and snacking does not correspond with previous findings with adult females^{1,12,13} (but see ¹⁴ who also failed to find a link between these two variables in adult females).

So, the moderator effects for external eating and restrained eating in the study by Snoek et al.¹⁸ were not replicated in the present study. One important difference between the studies was that Snoek et al. did not correct for the possible influence of the other eating styles. Another difference was the focus on pre-adoles-

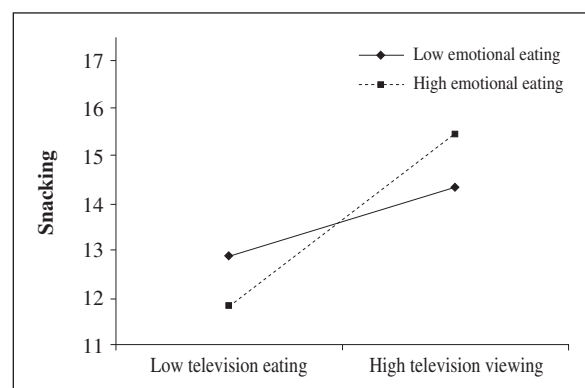


Fig. 1.—Two-way interaction between television viewing and emotional eating.

cent versus adolescent children. It is not yet known how eating styles develop during childhood and adolescence. Research on the emergence of emotional eating during adolescence suggests that it may develop in relation to depressive feelings and/or inadequate parenting (for example when the child is subjected to psychological parental control), possibly in relation with genetic susceptibility, though symptoms often do not occur until late adolescence or adulthood.^{30,31} In future research the interaction between gender and restrained eating would be worth studying, because this eating style may be especially present in girls and women.

It should be noted that emotional eating is only infrequently endorsed by our participants. On closer (post hoc) inspection, as many as 45% of the children answered "no" on all seven emotional eating items (in contrast: for external eating and dietary restraint this was true for less than 2%, respectively 13%). These findings are in close correspondence with previous studies that found comparable figures on emotional eating by self-report of 5 year old girls,³² by self-reports of parents on the emotional eating behavior of their 3-7 year old children³³, and of their 6-7 year old children.³⁴ Therefore, in young children, undereating seems to be a far more salient style than emotional overeating. The low prevalence of emotional eating would suggest that most (young) children still show a biological natural reaction to emotional stressors of not eating during distress and that emotional overeating is an acquired response.²⁴ One risk factor for acquirement of emotional eating may be TV-viewing, because TV-viewing has been associated with negative feelings,^{15,16} and with snacking^{18,35} (table I). Alternatively, snacking while watching television can be characterized as *mindless* eating where the individual pays little attention to satiety because their attention is focused on the television screen.³⁶ Mindless eating could in turn develop into emotional eating as awareness of hunger and satiety diminishes.

TV-viewing was not correlated with either BMI or degree of overweight, so the positive association between these variables found in some other studies e.g.¹⁸ was not confirmed in the present study. A further remarkable finding was that, although both external eating and emotional eating were positively associated with snacking, they were both negatively associated with BMI. While this finding may seem contradictory, it is in close correspondence to results found in other studies on (adolescent) children^{37,38,39} and parental influence could explain this conundrum. In preadolescence both TV-viewing and food intake is, more often than not, controlled by the parents, and parents of overweight children may be less likely to permit their children much TV-viewing, or snacking.^{38,40} A further possibility is that the children have not yet become overweight, but if a lot of TV-viewing, emotional eating, and snacking continues, obesity becomes more likely.³⁴ After all, TV-viewing has been associated with

other risk factors for overweight in children,⁴¹ including the tendency to skip breakfast, to be less involved in sport, and to spend more time on the computer.

There are a number of limitations to this study. Acquiescence and social desirability may have influenced the results, particularly so for the young and/or overweight children. A further weakness is that both predictors and outcome rely on children's self reports and not on observations. It can be questioned whether children as young as seven can provide veridical accounts of for example their TV-viewing (one question) or snacking behavior (two questions). However, a post-hoc analysis, in which the 83 children aged 7 were excluded, yielded highly similar results, so the present results do not seem to be much influenced by possible invalid reports of our youngest children. A third limitation is that the data were cross-sectional, while longitudinal data are necessary to generate conclusions about causal relations. Moreover, other sedentary behaviors, like playing on the computer, were not taken into account, while children can also snack during those behaviors. This limitation might also explain the relatively small negative correlation found between snacking and BMI. Finally, the measurement of snacking is limited because it was formulated to measure this behavior in general, not specifically while watching television.

One of the stronger points of this study is that this is one of the first to examine the possible moderators of TV-viewing as a risk factor for excessive snacking in a large sample of young boys and girls. Another strong point is that body weight and height was objectively measured and not self reported.

In conclusion, TV-viewing seems to be more strongly related to snacking in children with higher levels of emotional eating, implying that attention should be given to the role of TV-viewing in the development of this eating style. This is relevant because emotional eating does not occur very often in young children but has a strong link with overeating and overweight in adults, with and without eating disorders.^{42,43}

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