Associations between Children’s Television Advertising Exposure
and their Food Consumption Patterns: A Household Diary-Survey Study

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Abstract

In a diary-survey study in 234 households with children aged 4 to 12 years, we investigated the associations between children’s exposure to food advertising and their consumption of (a) advertised food brands, (b) advertised energy-dense food product categories, and (c) food products overall. Relations were examined using multiple hierarchical regression analysis, while controlling for various child (i.e., age, sex, television viewing time) and family variables (i.e., family income and consumption-related communication styles). Results showed that children’s exposure to food advertising was significantly related to their consumption of advertised brands ($\beta = .21$) and energy-dense product categories ($\beta = .19$). The relation between advertising exposure and overall food consumption only held in lower income families ($\beta = .19$). In addition, consumption-related family communication was an important moderator of the relations between advertising and the food consumption variables. Socio-oriented family communication (i.e., striving for harmony and conformity) was particularly successful in reducing these relations. In conclusion, consistent with communication theories predicting spill-over effects of advertising, the impact of television food advertising exceeded the advertised brand and generalized to more generic unhealthy consumption patterns. Theoretical and societal consequences, as well as the important role of the family are discussed.

Keywords: Advertising; Brands; Childhood; Consumption; Diary; Diet; Energy-dense food; Obesity; Survey; Television.
Associations between Children’s Television Advertising Exposure
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Introduction

The growing prevalence of overweight and obese children is receiving increasing public, political, and academic attention. Among the various factors identified as possible causes for the growth of childhood obesity, including time-trend changes in leisure activities and nutrition knowledge (Caroli, Argentieri, Cardone, & Masi, 2004), one factor continues to dominate the debate: television advertising aimed at children. Critics hold advertising responsible for the problem of childhood obesity because of its abundant promotion of energy-dense food, that is products containing relatively high proportions of fat, sugar, and salt (Hastings et al., 2003; Matthews, Cowburn, Rayner, Longfield, & Powell, 2004; Schor, 2005). Consequently, in many countries consumer and health organizations are pleading for restrictive policies regarding food advertising directed at children (Gantz, Schwartz, Angelini, & Rideout, 2007).

The principle aim of the present study is to investigate the popular conception that advertising is related to children’s unhealthy eating habits. We refer to this conception as the *food advertising effects hypothesis*. Based on current advertising and communication theories, we refine the food advertising effects hypothesis and empirically investigate it in a natural setting. To do so, we conducted a household diary-survey study investigating television viewing behavior and food consumption patterns of 4- to 12-year-old children.
Refining the Food Advertising Effects Hypothesis

The conception that child-directed food promotion is responsible for unhealthy consumption patterns is based on the assumptions that (a) advertising directed at children is dominated by energy-dense food product categories, and (b) children who are often exposed to advertising for these products have a less healthy diet than children who are less often exposed.

The first assumption underlying the advertising effects hypothesis finds support in several content analyses of child-directed advertising, which have shown that television advertising aimed at children is dominated by high-calorie and low-nutrient food and beverages (e.g., Buijzen & Valkenburg, 2002; Byrd-Bredrenner, 2002; Gantz et al., 2007; Matthews et al., 2004). Over the past decades televised food promotions targeting children have been found to be increasingly dominated by a “big five” of items: (sugared) breakfast cereals, confectionery, savory snacks, soft drinks, and fast food restaurants (for a review, see Hastings et al., 2003). Several researchers have concluded that the advertised diet contrasts sharply with that recommended by nutritionists and public health advisors (Gamble & Cotugna, 1999; Gantz et al., 2007; Hill & Radimer, 1997; Kotz & Story, 1994).

There is also empirical evidence for the second assumption underlying the advertising effects hypothesis. Research on the effects of food advertising has rather consistently shown that exposure to food advertising can increase children’s preferences, purchase requests, and consumption of the advertised brands (Borzekowski & Robinson, 2001; Goldberg, 1990; Gorn & Goldberg, 1982; Utter, Scragg, & Schaaf, 2006). These effects are often explained by hierarchical stimulus-response models of advertising effects, which assume that advertising leads to awareness and liking of the
advertised brand, and as a consequence, to purchase and consumption of the brand (Coon, Goldberg, Rogers, & Tucker, 2001; Petty & Cacioppo, 1996).

However, the question remains whether such responses to advertising will actually lead to unhealthy consumption patterns. Food industry advocates often claim that while advertising exposure may lead to consumers’ preferences and consumption of specific brands, it does not affect more generic food consumption patterns (Ambler, 2006). The distinction between advertising effects at a brand, a product category, and a total consumption level is vital in the debate about the role of food advertising with regard to children’s diets. After all, the role of advertising is relevant to the debate only when exposure to advertising leads to more generic consumption of heavily advertised product categories, that is, energy-dense food products. If advertising exposure would lead merely to brand choice (for instance Lays chips) and not to increased consumption of the energy-dense food category (in this case savory snacks), advertising-induced changes in children’s diets would hardly increase the risk of obesity.

In the advertising literature it is assumed that the impact of advertising may exceed the advertised brand, and extend to other products within the same product category (cf., Ambler, 2006; Atkin, 1982; Young, 2003). An explanation for such a spill-over effect on more generic consumption is found in Bandura’s social learning theory (Bandura, 1986, 1994), which proposes that modeled behaviors, such as eating portrayed in commercials, will lead to similar behavior among viewers. Thus, social learning explains responses to a broader category of depicted products, rather than to only the distinctive brands. Advertising exposure may therefore not only lead to brand switching, but also to increased consumption of energy-dense products and possibly increased food consumption overall.
Only a few studies have investigated the association between advertising and consumption of advertised product categories (Goldberg, Gorn, & Gibson, 1978; Wiecha et al., 2006) and food products overall (Halford, Boyland, Hughes, Oliveira, & Dovey, 2007; Halford, Gillespie, Brown, Pontin, & Dovey, 2004). Findings from these studies are in support of theories predicting spill-over effects of advertising and suggest that advertising may result in more generic consumption of energy-dense food products. However, the distinction between different levels of advertising effects has not yet been compared systematically.

For a full understanding of the association between food advertising and children’s consumption patterns, there is a need to refine the food advertising effects hypothesis and to examine the relations between children’s exposure to food advertising and their consumption of (a) advertised food brands, (b) advertised energy-dense product categories, and (c) food products overall. In the present study, we make an explicit distinction between these three dependent measures. We expect to find associations between children’s exposure and all three consumption variables.

In addition, based on demonstrated relationships with either advertising exposure, food consumption or both, we investigate the confounding role of several socio-demographic child (i.e., age, sex, TV viewing time) and family factors (i.e., income, consumption-related communication style). In their comprehensive theoretical framework of the causal mechanisms underlying the relations between environmental influences and energy balance-related behavior, Kremers et al. (2006) have proposed that socio-demographic factors may interact with these environment-behavior relations. Therefore, we expect that the various child and family variables will moderate the relations between advertising and the three consumption variables.
*Investigating the Refined Food Advertising Effects Hypothesis*

Thus far, the effects of advertising on children’s food consumption have predominantly been examined in experimental research (Borzekowski & Robinson, 2001; Dawson, Jeffrey, & Walsh, 1988; Galst, 1980; Gorn & Goldberg, 1980; Halford et al., 2004; 2007). In these experiments, children usually watch one or more commercials, after which they are given a choice from a series of products, which include the advertised brand. Researchers have often demonstrated that the advertising of a specific brand makes the child’s subsequent choice of that brand more likely. A disadvantage of these studies is that the results that are found within a controlled laboratory setting may not be generalizable to more naturalistic contexts (Young, 1990).

A number of studies have attempted to overcome this problem by investigating advertising effects in a more natural setting, for instance using survey or diary methods (Bolton, 1983; Coon et al., 2001; Kremers, van der Horst, & Brug, 2007; Ritchey & Olson, 1983; Taras, Sallis, Patterson, Nader, & Nelson, 1989; Utter et al., 2006; Wiecha et al., 2006). Such methods are potentially able to take more naturalistic measures of behavior than are experimental studies. However, earlier studies have often relied on self-reported estimates of general television exposure, for instance by operationalizing exposure as “frequency of television viewing.” A limitation of this measure is that it lacks specificity concerning the amount and nature of the advertisements to which respondents have been exposed (see Slater, 2004). In addition, it is impossible to say whether the effect can be attributed to food advertising in particular or to alternative hypothesized television effects, such as the sedentary nature of television viewing or snacking that might take place while viewing (Jordan, 2007; Snoek, van Strien, Janssens, & Engels, 2006; Vandewater, Shim, & Caplovitz, 2004).
A strategy to increase the accuracy and specificity of self-reports of advertising exposure is to assess which networks children watch. Furthermore, uncertainty concerning the content to which respondents report exposure can be reduced by combining these more specific exposure data with information on the amount and nature of advertisements broadcast on these networks (Gantz et al., 2007; Slater, 2004). Therefore, the present study combines a household diary-survey study with broadcast data on television food advertising.

Method

Data were collected in two waves during the spring of 2006, in urban and suburban districts adjacent to Amsterdam, The Netherlands. To be able to provide a detailed and accurate assessment of (a) the amount and nature of food advertising that children were exposed to and (b) the amount and nature of food products they consumed, we used a multiple-method inquiry. More specifically, we combined a structured food diary with questionnaire data and advertising broadcast data.

Sample

In early 2006, we approached parents from children in eight elementary schools, which consisted of students with various socio-economic and cultural backgrounds. In a letter administered via the schools, parents were informed about the nature of the study and asked to participate. Of the 380 parents who agreed to participate, 234 (i.e., 62%) returned a completed diary and questionnaire. This resulted in a total sample of 234 parents of children between the ages of 4 and 12 years (51.5% boys).

In the sample, all educational levels of parents were represented, although most of the parents were relatively well educated: 32% had completed high school, 37% were college graduates, and 21% had a master’s degree. Family incomes ranged from less
than 12 500 euro per year (USD 14 950; 12% of the sample) to more than 48 000 euro per year (USD 57 450; 18% of the sample).

**Procedure**

The children were given an envelope to take home to their parents that contained a food diary and a questionnaire. The package was accompanied by instructions, asking the primary caregiver to report all of the food products and beverages their child consumed each day during a 4-day period, which covered two specific week- and two weekend days. The instruction also emphasized the importance of recording the brand names of the products consumed. In addition to the diary, parents were asked to fill out a questionnaire tapping a number of child- (age, sex, television viewing behavior) and family-related control variables (income, family communication patterns). After the packages were returned, two coders listed and coded all foods and beverages consumed by each child during the time of investigation. In order to estimate the amount and nature of television food advertising, we used a dataset provided by Nielsen Media Research of all advertisements broadcast in the Netherlands in the month leading up to the investigation.

**Measures**

Our analyses were based on one independent measure (exposure to energy-dense food advertising), three dependent measures (consumption of advertised brands, advertised energy-dense product categories, and food products overall) and six child- and family-related confounding variables. The ranges, means, and standard deviations of all measures are depicted in Table 1.

*Food advertising exposure.* To assess children’s exposure to energy-dense food advertising, we combined children’s television viewing behavior with advertising
broadcast data (cf., Gantz et al., 2007; Slater, 2004). Parents were asked to indicate which network their child watched the most. Based on the Nielsen advertising broadcast data we analyzed how many commercials for the “big five” energy-dense product categories (i.e., sugared breakfast cereals, confectionery, savory snacks, soft drinks, and products from fast food restaurants) were broadcast on each of the 15 networks reported by parents. The number of energy-dense food commercials ranged from 0 to 1684 per network. For each child, a food advertising exposure score was created, which reflected the amount of food commercials broadcast on his or her favorite network.

Consumption of advertised brands, energy-dense product categories, and food products overall. The three dependent consumption measures expressed the number of food products or beverages a given child consumed during an average day. First, the coders listed all products consumed by each child during the time of investigation. To create a measure for children’s daily overall food consumption, the total number of food products consumed was divided by the number of days included in the investigation.

Then, using the same set of advertising broadcast data as mentioned above, the coders assessed (a) whether or not the specific brand consumed was advertised in the month leading up to the investigation, and (b) whether or not the product consumed belonged to one of the “big five” product categories (i.e., sugared breakfast cereals, confectionery, savory snacks, soft drinks, and products from fast food restaurants).

To create a measure for children’s daily consumption of advertised brands, the total number of food brands consumed that had been advertised on television was divided by the number of days included in the investigation. Similarly, the number of energy-dense food product categories consumed was divided by the number of days to create a measure of daily consumption of energy-dense product categories. Of the total
food products consumed, 17% belonged to one of the energy-dense product categories and 3% were brands advertised on television. The advertised brands comprised 19% of all energy-dense products consumed.

Confounding variables. Finally, a number of child- and family-related factors were included as confounding variables in the analyses. Child variables included: (a) age of child, (b) sex of child, and (c) weekly television viewing time. Family variables included (a) family income, (b) concept-oriented consumption-related family communication, and (c) socio-oriented consumption-related family communication (Buijzen & Valkenburg, 2005; Carlson & Grossbart, 1988). The concept-oriented communication scale consisted of 6 items measured on a 4-point scale, reflecting a communication style that emphasizes negotiation, individual ideas, and opinions (α = .74), while the socio-oriented communication scale consisted of 6 items reflecting a communication style that stresses harmony and conformity (α = .66). To investigate the moderating role of family income and consumption-related communication style, different subgroups were created by way of mean splits.

Analyses

Before the hypothesis tests were conducted, bivariate correlations were used to explore associations between the independent, dependent, and confounding measures. All correlations are depicted in Table 1. As can be seen in the table, food advertising exposure was related to consumption of energy-dense product categories, but not to food consumption overall. In addition, the three consumption variables were interrelated positively. Finally, the various confounding variables showed significant associations with the measures for advertising exposure and food consumption, and were therefore included in the hypothesis tests.
Hierarchical multiple regression was used to test the hypothesized relations between advertising exposure and children’s consumption of advertised brands, energy-dense product categories, and food products overall. To test for a moderating influence of child and family variables, we conducted interaction analysis in multiple regression, following the procedure described by Aiken and West (1991). All regression models controlled for the child and family variables described above. In all analyses, $p$-values of < .05 were considered significant.

Results

To test the refined food advertising effects hypothesis, we conducted three hierarchical regression analyses, with children’s consumption of advertised brands, energy-dense product categories, and food products overall as the dependent variables. The six confounding variables were entered on the first step, and children’s advertising exposure was entered on the second step. Thus, the hypothesis tests were performed on the second step of each equation. Table 2 provides the summary of the hierarchical regression predictions for the three dependent variables.

The first step accounted for 8% of the variance in children’s consumption of advertised brands, $F(6, 226) = 3.20, p < .01$; 16% of the variance in consumption of
energy-dense product categories, $F(6, 226) = 7.21, p < .001$; and 28% in consumption of food products overall, $F(6, 226) = 14.52, p < .001$.

The second step resulted in a significant increase in the variance explained for children’s consumption of advertised brands and energy-dense product categories, but not for consumption of food products overall (see Table 2). Children’s advertising exposure added 4% to the explained variance in consumption of advertised brands, leading to $F(7, 225) = 4.22, p < .001$ and 3% to the variance in consumption of energy-dense product categories, leading to $F(7, 225) = 7.60, p < .001$. As Table 2 demonstrate, children’s exposure to food advertising was significantly and positively related to their consumption of advertised brands and energy-dense product categories.

To investigate the moderating effect of the child and family variables, we used interaction analysis in multiple regression (cf. Aiken & West, 1991). We conducted six additional sets of regression analyses with the three consumption variables as the dependent measures. In each set of analyses, three principle predictors were entered: (1) advertising exposure, (2) one of the six confounding variables (i.e., child age, child sex, child television viewing time, family income, socio-oriented family communication, concept-oriented family communication), and (3) the product term of advertising exposure and that confounding variable. In addition, we also controlled for the remaining child and family factors.

If the confounding variable indeed moderated the relation between advertising exposure and consumption, a significant two-way interaction between advertising exposure and the confounding variable should occur (Aiken & West, 1991). The analyses yielded no significant interaction effects for the child variables, indicating that the relations between advertising and the three consumption variables did not vary for
younger and older children, boys and girls, and low- and high-television viewing children.

However, several significant interaction effects emerged for the family variables. In order to understand the moderator patterns for the family variables more thoroughly, Table 3 presents the associations between advertising exposure and the three consumption variables in different subgroups, defined in terms of family income (i.e., low vs. high) and family consumer communication style (i.e., low vs. high concept orientation; low vs. high socio orientation).

-- Please Insert Table 3 --

First, the interaction analyses for income yielded a positive moderator effect on the relation between advertising exposure and consumption of advertised brands ($\beta = .15, p < .05$), indicating that this relation was significantly stronger among children from higher income families. Although the relation between advertising exposure and food consumption overall was considerably stronger in low-income families (see Table 3), the interaction was nonsignificant ($\beta = -.08, p = .17$).

Second, the analyses for concept-oriented family communication showed that the relation between advertising exposure and consumption of energy-dense product categories was significantly weaker among children from families high in concept orientation than from families low in concept orientation ($\beta = -.13, p < .05$). Finally, the analyses for socio-oriented communication yielded significant negative interaction effects for the relations between advertising exposure and consumption of energy-dense
product categories ($\beta = -0.20, p < 0.01$) and consumption of food products overall ($\beta = -0.19, p < 0.01$).

Discussion

In a combined diary-survey study, we investigated the refined food advertising effects hypothesis. We extended and improved on previous research by distinguishing between different levels of food advertising effects and by using a more specific measure of food advertising exposure.

*Three Levels of Food Advertising Effects*

Our study was the first to compare the effects of food advertising on consumption of the specific advertised brand, the more generic advertised product category, and food products overall. As predicted, we found that food advertising not only affected children’s brand choice, but also extended to their consumption of energy-dense food product categories. Thus, consistent with communication theories predicting spill-over effects of advertising (Atkin, 1982; Bandura, 1986, 1994), the impact of television food advertising generalized to other brands within the same product category as the advertised brand. In low-income families, children’s exposure to food advertising was also associated with overall food consumption.

*Food Advertising Exposure vs. Television Viewing Time*

We also expanded on previous research by using a specific measure of food advertising exposure. Earlier studies often relied on general estimates of television exposure. Such non-specific proxy measures leave room for alternative explanations for television effects, such as the “grazing” hypothesis, which attributes the effect of television to snacking that might take place while viewing (van den Bulck & van Mierlo, 2004; Vandewater et al., 2004). By isolating children’s advertising exposure
while controlling for television viewing time, our analyses revealed two patterns that deserve more attention. First, two consumption measures (i.e., advertised brands and energy-dense product categories) were predicted by advertising exposure but not by television viewing time, which confirms the assumption that changes in consumption can be attributed to food advertising rather than to other factors associated with television viewing.

The second pattern observed sheds new light on the grazing hypothesis. Although overall food consumption was not related to advertising exposure, it was significantly associated with television viewing time. Remarkably, the analysis yielded a negative link between television viewing and food consumption. It is conceivable that heavy-television viewers expend less energy due to the sedentary nature of television viewing, and thus have less of an appetite. However, in our study, while total food consumption decreased as a function of television viewing, the amount of energy-dense food intake remained equal, indicating that the proportion of energy-dense food was higher in heavy-viewers’ diets. In other words, television viewing appeared to be related to dietary quality rather than quantity. This interpretation concurs with earlier research yielding negative associations between television and children’s consumption of foods not normally advertised, such as fruit and vegetables (Boynton-Jarrett et al., 2003; Coon et al., 2001; Gable, Chang, & Krull, 2007; Halford et al., 2007).

The Family Context

Aside from advertising exposure, family income was the most important predictor of children’s consumption patterns. Children from higher-income families consumed more food products overall, more advertised energy-dense product categories, and more advertised brands. A possible explanation for this finding is that
high-income parents can afford to spend more money on food than lower-income parents, resulting in a higher food availability in these households, as well as a tendency to purchase more expensive branded foods and beverages (Ambler, 2006; Kinsey, 1994, 1997). In addition, higher-income households are often comprised of dual-working parents who, due to time pressure, are more inclined to purchase convenience food (Ambler, 2006; Coon et al., 2001; Kinsey, 1997).

Based on Kremers et al.’s (2006) framework of the mechanisms underlying environment-behavior relations, we also investigated the moderating role of family income and consumption-related communication style on the relations between advertising and consumption. First, our results showed that the relation between advertising exposure and advertised brands was significantly stronger in high-income families, while the relation between advertising exposure and total food consumption only held in low-income families. In other words, while in high-income families advertising was mainly related to brand choice – which might be explained by the higher availability of branded products in these households – children in low-income families appeared to be especially sensitive to advertising effects on the amount of foods and beverages consumed. These results seem to indicate that the dietary patterns of children from low-income families are more strongly influenced by television advertising than those of children from high-income families.

Second, family communication about consumer matters also played an important role. The relations between advertising exposure and the consumption variables were considerably reduced in families characterized by high levels of consumption-related communication. Especially socio-oriented family communication (i.e., emphasizing harmony and conformity) considerably moderated the various
relations. These findings are in agreement with family communication research that shows that family communication about consumer matters can mitigate, channel, or counteract undesirable media effects (Buijzen & Valkenburg, 2005; Nathanson, 1999).

Future research should further explore the role of family variables in the relation between advertising and consumption. Although children exert increasing influence on family purchases (Valkenburg, 2004), parents are still the primary gatekeepers to children’s food intake. In general, they are the ones controlling financial expenditures and making the final purchase decision in the retail environment (Mangleburg, 1990). In addition, most parents control access to food at home, for instance by family rules on snacking and by determining what’s for dinner (Bolton, 1983; Cullen et al., 2001; Kremers, Brug, & de Vries, 2003). However, indirectly, parents may also be susceptible to food advertising directed at children. Research on family consumer behavior has shown that many parents seriously take into account the wants and preferences of their children when shopping (Mangleburg, 1990; McNeal, 1999; Williams & Burns, 2000). It is conceivable that parents indulge their children by purchasing branded foods and beverages.

Conclusions and Policy Implications

In conclusion, the question that dominates the public and political debate about child-directed food advertising can be answered affirmatively: Television food advertising contributes to an unhealthy diet. Advertising for energy-dense products influences not only children’s consumption of the brands advertised, but also more generic consumption of energy-dense food. These products seem to replace healthier, non-advertised products in children’s diets. The impact of advertising was strongest among families with low levels of consumption-related communication.
However, it should be noted that our findings are based on correlational data, implying that we cannot draw definite conclusions about the causal direction of the observed relations. In addition, even though our measure for advertising exposure was more specific than those used in earlier studies, it is uncertain whether the children were actually exposed to the commercials, because no information was gathered regarding actual viewing periods. In order to further improve on specific advertising exposure measures, future research could combine children’s self-reported viewing behavior with advertising broadcast data.

A third limitation of our study is that, although the link between advertising and children’s consumption patterns was established, the question is still open as to how this, in turn, affects the risk of obesity. Obesity is generally assumed to be caused by an excess of calorie intake relative to calorie output (Ambler, 2006; Kremers et al., 2006). For a full understanding of childhood obesity, we should not only focus on advertising, but also on other forces, including the general lifestyles of children and their families. However, based on this study’s findings, we encourage scholars investigating the causes of childhood overweight to incorporate the role of food advertising in their research designs.

Taking these reservations into account, our results do appear to support consumer and health organizations in their call for advertising restrictions. Assuming that exposure to food commercials leads to less healthy eating habits, it is plausible that children would benefit from a reduction in commercial pressure. However, two arguments can be raised against restrictions of television advertising. First, it is uncertain whether it is feasible to shelter children from being exposed to food marketing. Even though children’s food promotion is still dominated by television
advertising, marketers have a wide variety of tools at their disposal, including internet websites, product packaging, and product placement in popular children’s programs. Children represent an attractive and lucrative consumer market and it is quite likely that a ban on television advertising will result in a shift towards other marketing tools (Schor, 2005).

Moreover, it is uncertain whether it is useful to shelter children from advertising. Research on advertising intervention has shown that intervention strategies aimed at increasing children’s defenses against advertising are more successful in reducing the impact of advertising than strategies aimed at restricting children’s advertising exposure (Buijzen & Valkenburg, 2005). Therefore, policy makers, consumer organizations, and those involved in children’s daily care could put more effort in the empowerment of children. A first empowerment strategy could aim at the enhancement of nutrition and health knowledge among children and their parents, while a second could focus on increasing children’s consumer skills. In several countries, such as Canada, the UK, and The Netherlands, school-based consumer education programs have been introduced in recent years. Given the continuous increase of marketing efforts directed at children, such education should, in our view, be a standard part of children’s school curriculum.
References


Gable, S., Chang, Y., & Krull, J. L. (2007). Television watching and frequency of family meals are predictive of overweight onset and persistence in a national


Table 1

*Means, Standard Deviations, and Correlation Coefficients for all Variables*

<table>
<thead>
<tr>
<th>Range</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Food advertising exposure</td>
<td>0 - 1684</td>
<td>295.50</td>
<td>275.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Consumption advertised brands</td>
<td>0 - 3</td>
<td>0.49</td>
<td>0.56</td>
<td>.20**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Consumption energy-dense product categories</td>
<td>0 - 7</td>
<td>2.56</td>
<td>1.22</td>
<td>.22**</td>
<td>.54***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4. Consumption food products overall</td>
<td>5 - 24</td>
<td>15.25</td>
<td>3.84</td>
<td>.02</td>
<td>.26***</td>
<td>.45***</td>
<td></td>
<td></td>
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<td>5. Child age</td>
<td>4 - 12</td>
<td>7.85</td>
<td>2.50</td>
<td>.20**</td>
<td>.13*</td>
<td>.32***</td>
<td>.05</td>
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<td></td>
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<tr>
<td>6. Child sex*</td>
<td>0 - 1</td>
<td>0.48</td>
<td>0.50</td>
<td>-.02</td>
<td>.05</td>
<td>.10</td>
<td>.15*</td>
<td>.06</td>
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<tr>
<td>7. Child weekly television viewing time</td>
<td>0 - 61.5</td>
<td>12.07</td>
<td>9.47</td>
<td>.11</td>
<td>-.00</td>
<td>-.02</td>
<td>-.39***</td>
<td>.06</td>
<td>-.10</td>
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<td></td>
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<td>8. Family incomeb</td>
<td>0 - 7</td>
<td>3.65</td>
<td>2.26</td>
<td>-.10</td>
<td>.24***</td>
<td>.24***</td>
<td>.38***</td>
<td>.07</td>
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<tr>
<td>9. Family concept-oriented communication</td>
<td>1 - 4</td>
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<td>0.53</td>
<td>-.01</td>
<td>-.03</td>
<td>-.03</td>
<td>-.19**</td>
<td>.20**</td>
<td>-.02</td>
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<td>10. Family socio-oriented communication</td>
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<td>-.13*</td>
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<td>-.26***</td>
<td>.05</td>
<td>-.11</td>
<td>-.07</td>
</tr>
</tbody>
</table>

*Note.* a 0 = boys, 1 = girls; Spearman’s rho correlations were computed for this variable. b 0 = 12 500 euros per year (USD 14 950); 7 = 48 000 euros per year (USD 57 450). *p < .05. **p < .01. ***p < .001.
### Table 2

**Summary of Hierarchical Regression Analyses for Variables Predicting Children’s Food Consumption**

<table>
<thead>
<tr>
<th></th>
<th>Advertised brands</th>
<th>Energy-dense product categories</th>
<th>All food products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Child variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.07a (.10)b</td>
<td>.27*** (.30***)</td>
<td>.05 (.07)</td>
</tr>
<tr>
<td>Sex</td>
<td>-.01 (.01)</td>
<td>.06 (.07)</td>
<td>.10 (.11)</td>
</tr>
<tr>
<td>Television viewing time</td>
<td>.03 (.04)</td>
<td>.01 (.02)</td>
<td>- .30** (-.29***)</td>
</tr>
<tr>
<td><strong>Family variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>.26*** (.23***)</td>
<td>.23*** (.21***)</td>
<td>.31*** (.30***)</td>
</tr>
<tr>
<td>Concept-oriented comm.</td>
<td>-.01 (-.03)</td>
<td>-.04 (-.06)</td>
<td>-.10 (-.10)</td>
</tr>
<tr>
<td>Socio-oriented comm.</td>
<td>-.03 (-.07)</td>
<td>-.01 (-.05)</td>
<td>.14* (.12*)</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>.08</td>
<td>.16</td>
<td>.28</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food advertising exposure</td>
<td>.21**</td>
<td>.19**</td>
<td>.10</td>
</tr>
<tr>
<td><strong>R² change</strong></td>
<td>.04**</td>
<td>.03**</td>
<td>.01</td>
</tr>
<tr>
<td><strong>Total R²</strong></td>
<td>.12</td>
<td>.19</td>
<td>.29</td>
</tr>
</tbody>
</table>

Note. a Cell values without brackets are standardized multiple regression weights reflecting the relation between the predictor and the dependent variable while controlling for all of the variables entered. b Cell values between brackets reflect the relation in the first step of the analysis. *p < .05. **p < .01. ***p < .001.
Table 3

*Moderating Influence of Family Variables on the Relations Between Children’s Advertising Exposure and Food Consumption*

<table>
<thead>
<tr>
<th></th>
<th>Advertised brands</th>
<th>Energy-dense product categories</th>
<th>All food products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>β</td>
<td>β</td>
</tr>
<tr>
<td>Family income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low income (n = 103)</td>
<td>.12&lt;sup&gt;y&lt;/sup&gt;</td>
<td>.26</td>
<td>.19</td>
</tr>
<tr>
<td>High income (n = 131)</td>
<td>.38&lt;sup&gt;x&lt;/sup&gt;</td>
<td>.15</td>
<td>.01</td>
</tr>
<tr>
<td>Family communication styles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low concept orientation (n = 108)</td>
<td>.23</td>
<td>.33&lt;sup&gt;x&lt;/sup&gt;</td>
<td>.18</td>
</tr>
<tr>
<td>High concept orientation (n = 126)</td>
<td>.17</td>
<td>.06&lt;sup&gt;y&lt;/sup&gt;</td>
<td>.06</td>
</tr>
<tr>
<td>Low socio orientation (n = 122)</td>
<td>.27</td>
<td>.29&lt;sup&gt;x&lt;/sup&gt;</td>
<td>.20&lt;sup&gt;x&lt;/sup&gt;</td>
</tr>
<tr>
<td>High socio orientation (n = 112)</td>
<td>.07</td>
<td>-.02&lt;sup&gt;y&lt;/sup&gt;</td>
<td>-.05&lt;sup&gt;y&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*Note.* Cell values reflect the relations between food advertising exposure and the dependent variable while controlling for the various child (age, sex, television viewing time) and family variables (income, concept- and socio-oriented communication).

<sup>x,y</sup> Column values with different superscripts differ significantly at $p < .05$