Media use as a reason for meal skipping and fast eating in secondary school children

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Keywords

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Abstract

Objective This study examined self-reported meal skipping and eating faster than usual with the goal of watching television or playing computer games.

Method Respondents reported their media use and indicated how often they skipped a meal to watch a favourite television programme or to play a computer game, and how often they ate faster than usual in order to watch television or play a computer game.

Subjects Respondents were 2546 adolescents of 13 (first year of secondary school) and 16 years (fourth year of secondary school) of age.

Results About one respondent in 10 skipped at least one meal every week for either television viewing or computer game playing. Weekly meal skipping for television viewing occurs more regularly in boys and first-year students, but particularly in teenagers who view 5 h or more daily (15% of the sample). The category of teenagers who play computer games four times a week or more (25.3% of the sample) is at increased risk of meal skipping; those who play more than four times a week are 10 times more likely weekly to skip a meal. A quarter of the adolescents eat faster at least once a week to be able to watch television or play a computer game. Regardless of gender and school year, teenagers' risk of eating faster progressively increases with their use of the media. Those who watch 4 h or more daily are about seven times more likely to skip a meal for television and those who play computer games at least four times a week are nine times more likely weekly to skip a meal.

Conclusions Unhealthy eating habits can be a side effect of heavy or excessive media use. Teenagers' use of television or game computers during nonworking or out-of-school hours partly displaces the amount of time that needs to be spent at meals. Practitioners and educators may try to encourage or restore a pattern of healthful meal consumption habits by reducing the amount of media use, and by supporting parental rule-making regarding children's eating habits and media use.

Introduction

There is a small but growing body of research dealing with the relationship between media use and unhealthy eating habits. It appears that the majority of studies have focused mainly on only one of the media – television – and on only one eating-related issue – energy intake. This means that most research deals with the relationship between television viewing and obesity. Generally speaking, four processes have been identified through which television viewing might increase the risk for obesity. First, television viewing might displace more active pastimes (Janssen *et al.*, 2004) and, secondly, television viewing might lead to reduced energy expenditure because of a decrease in the metabolic rate (Robinson *et al.*, 2001). Thirdly, television viewing may lead to increased caloric intake through the consumption of snacks, candy, fast foods and (soft) drinks while viewing (Robinson *et al.*, 2001; Van den Bulck & Van Mierlo, 2004). In addition, television viewing has been linked to changes in food choice, probably as a result of exposure to advertising (Robinson *et al.*, 2001).

There is a fifth way in which television and other media use might disrupt healthy eating habits; media use may have an impact on both the *amount of time* that is spent eating and the *points in time* at which meals are planned. With respect to the latter, Van den Bulck (2000) suggested that when a conflict arises between the television programme schedule and family eating habits, meal times may be shifted to allow family members to watch certain programmes. The first type of time effects, in which media use is a risk factor for reducing the amount of time that is spent eating, seems not to have been studied to date. Neither a partial reduction, i.e. fast eating nor a total reduction, i.e. meal skipping, appears to have been examined. Two lines of research suggest that speculations about meal-time displacement effects in adolescence may be warranted. First, studies have documented the importance of media use in teenagers' leisure time. For instance, the 2005 *Generation M* Study by the Kaiser Family Foundation (Roberts *et al.*, 2005) described a level of media saturation in the lives of children and

adolescents that almost inevitably must produce time displacement effects. Media use took up around 6.5 h per day on top of the time spent at school and sleeping. Television was the most prominent of the screen media, and computer games were the interactive medium with which most time is spent (Roberts *et al.*, 2005). Secondly, studies have described the incidence of irregularities in children's and adolescents' meal consumption and have pointed at the associated risks. Gross *et al.* (2004) illustrated the harmful impact of skipping breakfast on both the quality of nutrients consumed by elementary school children and their academic performance. Haapalahti *et al.* (2003) found similar effects in children with no regular family dinner and Pollit (1995) reported a relationship between skipping meals and children's performance in problem-solving tasks. Eisenberg *et al.* (2004) and Sjöberg *et al.* (2002) showed that the irregular consumption of main meals may also be related to unhealthy lifestyle patterns, with the frequency of habitual family dinners being inversely associated with tobacco, alcohol and marijuana use in a sample of adolescents.

It is therefore important to study the extent to which media-induced time displacement effects occur. At the very least, media use may be an indicator of unhealthy eating patterns; at most, they may be encouraging unhealthy eating patterns, or, alternatively, they may push the time that is needed for adequate eating patterns aside. The present study aimed to examine the extent to which adolescents skip meals or eat more rapidly to be able to watch television or to play computer games.

Method

Participants

This study used data from the Leuven Study on Media and Adolescent Health (SOMAH), a research project that was funded by the Ministry of Welfare of the Flemish Government (Belgium) to explore relationships between contemporary patterns of media use and behavioural health risks in adolescence. A two-step sampling method was

used. First, 15 schools were randomly selected from the list of 442 schools that are officially registered at the Flemish Department of Education. To ensure representation of different parts of Flanders and of Flanders' different schooling levels, schools located in various regions and schools that provide diverse types of schooling were targeted. The number of selected schools from each of the five provinces in Flanders was in proportion to the actual number of pupils in each region. The sample was proportionately stratified for the three education levels in Flanders' secondary school system. In the second phase, research assistants visited all seventh and 10th grade classes in the 15 selected schools during a regularly scheduled classroom period and asked the students to complete a structured, paper-and-pencil questionnaire. The study was presented as an omnibus study on the leisure habits of youngsters. Respondents were guaranteed that all responses would be treated confidentially.

The total number of students in the selected classes was 3000, but inaccurate information from the schools, sickness, truancy and refusal to co-operate led to a final sample size of 2546 adolescents; 50.2% of the sample was first-year students. In the first year, the average age was 13.16 years ($SD = 0.43$); in the fourth year, the average age was 16.37 years ($SD = 0.71$). Boys made up 54.2% of the sample.

Measures

Meal skipping and fast eating: to assess the two distinct types of time displacement effects on which this study focuses, four questions were developed by the authors. Respondents were asked to answer the following questions: (a) How often do you skip a meal to watch a favourite television programme? (b) How often do you eat faster than usual to be able to watch television? (c) How often do you skip a meal to play a computer game? (d) How often do you eat faster than usual to be able to play a computer game? Answers were on a 6-point scale, ranging from 1, *never*; 2, *once a year*; 3, *once a month*; 4, *once a week*; 5, *several times a week*; to 6, *everyday*.

Although restricted accuracy of quantification, as well as lack of detail, has been described as

drawbacks of food frequency questionnaires – especially in comparison with food diaries and repeated recalls (Vereecken *et al.*, 2005) – this assessment was regarded adequate for mapping the prevalence of these behaviours. The questions did not aim at monitoring exact intakes or at detecting dietary changes.

Media use

Television viewing is so widespread that almost all children watch almost every day. General TV viewing levels were, therefore, estimated by giving the respondents a timeline beginning at 7 a.m. and ending at 1 a.m. They were asked to cross each half hour of the day in which they usually watched television. There were seven time lines, one for each day of the week. The answers were summed to form an estimate in hours of weekly viewing volume. Computer game play is not (yet) a generalized and daily form of media use. Computer game play was, therefore, measured by asking how often the respondent played computer games. Answers were on a 7-point scale, from 1, *never*; 2, *once or twice a month or less*; 3, *once a week*; 4, *twice a week*; 5, *three times a week*; 6, *four times a week*; to 7, *more than four times a week*.

Studies into the assessment of media use have pointed out that different self-report methods, such as an *aided recall method* which was used for television viewing, and a *global estimates method* which was used for computer game play, yield comparable rank orderings of respondents. These methods are comparable in the extent to which they separate respondents into light, moderate, and heavy users. Strong associations between the different types of self-report have been described (see Krosnick *et al.*, 2003).

Results

Meal skipping and fast eating due to television viewing and computer game playing

Table 1 lists the means and the frequencies of skipping meals and eating faster with the aim of viewing television or playing computer games. In general, about one respondent in five (20.1%)

Table 1 Means (SD) and frequencies (in percentages) of meal skipping and fast eating as a result of TV viewing or computer game play

Measure	First year		Fourth year		Total	n
	Boys	Girls	Boys	Girls		
Skip meal for TV never	1.9 (1.3)	1.7 (1.1)	1.6 (1.1)	1.6 (1.1)	1.7 (1.1)	
Never	58.4	63.4	66.2	65.8	63.4	1591
Once a year	17.5	17.9	14.4	17.0	16.6	418
Once a month	8.3	10.2	11.6	9.6	10.0	250
At least weekly	15.8	9.5	7.8	7.6	10.1	252
Skip meal for computer game	1.6 (1.1)	1.4 (0.8)	1.7 (1.3)	1.3 (0.9)	1.5 (1.1)	
Never	72.5	81.0	70.0	84.7	76.6	1913
Once a year	11.7	9.6	9.3	5.8	9.2	230
Once a month	6.4	4.7	6.7	4.2	5.6	140
At least weekly	9.3	4.6	13.9	05.3	9.6	116
Eat faster for TV	2.7 (1.7)	2.5 (1.5)	2.5 (1.6)	2.3 (1.4)	2.5 (1.6)	
Never	39.4	40.8	44.6	42.9	41.9	1039
Once a year	11.2	14.9	8.2	15.6	12.3	304
Once a month	14.3	17.2	17.9	17.8	16.7	415
At least weekly	35.2	27.1	29.3	23.8	29.1	720
Eat faster for computer game	2.5 (1.7)	2.0 (1.5)	2.6 (1.7)	1.8 (1.3)	2.3 (1.6)	
Never	46.9	59.6	44.1	67.3	53.7	1341
Once a year	7.0	11.1	9.5	9.7	9.3	231
Once a month	14.6	11.0	14.5	9.1	12.5	313
At least weekly	31.5	18.4	31.8	13.9	24.5	612
n	673 (27%)	576 (23%)	689 (27%)	571 (23%)		2495

skipped a meal for television viewing at least monthly. A linear model (GLM) shows the average occurrence of meal skipping to be different for gender [$F(1,2505) = 7.31$, $P < 0.01$], school year [$F(1,2505) = 11.36$, $P < 0.001$], and the interaction between both variables [$F(1,2505) = 5.73$, $P < 0.05$]. *Post-hoc* analysis reveals that skipping meals due to television viewing is more common in boys and first-year children. It occurs more regularly in the group of first-year boys than in all other groups.

Skipping meals for computer game play occurs at least monthly in 15.4% of the sample. Linear effects of gender [$F(1,2494) = 53.87$, $P < 0.0001$] and of the interaction between gender and school year [$F(1,2494) = 4.11$, $P < 0.05$] indicate that meal skipping for computer game play is most common in the category of first- and fourth-year boys and is rare among girls. Over 80% of the girls never skip a meal for computer game play, whereas 15.7% of the first-year boys and 20.6% of the fourth-year boys skip a meal at least monthly.

Eating faster to be able to watch a television programme is distinctly more common than skipping meals. Three respondents in 10 (29.1%)

eat faster at least weekly. General linear modelling demonstrates mean differences for gender [$F(1,2472) = 11.51$, $P < 0.001$] and school year [$F(1,2472) = 9.46$, $P < 0.005$]; eating faster for television occurs more regularly in boys and in first-year students. For example, in the category of first-year boys, 35.2% reported eating faster on at least a weekly basis.

About a quarter of the adolescents in this sample (24.5%) reported to eat faster for computer games at least once a week. A general linear model shows effects of gender [$F(1,2491) = 112.84$, $P < 0.0001$], and of the interaction between gender and school year [$F(1,2491) = 5.40$, $P < 0.05$]. *Post-hoc* analysis indicates a strong gender difference, a difference that comes into view somewhat more explicitly among the fourth-year pupils. Compared with girls, almost twice as many boys eat faster for computer games at least once a week; 31% of the boys eat faster at least once a week.

Media use

Table 2 shows the means and the frequencies of television viewing volume and the frequency

Table 2 Means (SD) and frequencies (in percentages) of TV viewing or computer game play

Measure	First year		Fourth year		Total	n
	Boys	Girls	Boys	Girls		
Television viewing	3.1 (1.6)	2.5 (1.4)	2.7 (1.6)	2.2 (1.4)	2.7 (1.6)	156
0–1 h	3.5	5.1	7.1	9.2	6.1	454
1–2 h	12.6	17.7	16.7	25.7	17.8	685
2–3 h	22.3	31.9	24.0	30.9	26.9	557
3–4 h	24.1	23.9	21.8	17.3	21.9	311
4–5 h	15.6	10.5	13.6	8.4	12.2	196
5–6 h	10.5	5.9	8.5	5.2	7.7	185
6 h and more	11.4	5.1	8.4	3.3	7.3	
Computer game play	4.8 (1.8)	3.3 (1.7)	4.7 (1.9)	2.3 (1.5)	3.8 (2.0)	326
Never	2.9	13.3	5.6	36.3	13.5	463
At least once a month	10.4	24.5	13.4	31.5	19.1	374
At least once a week	13.7	21.8	13.4	13.6	15.4	334
Twice a week	17.8	15.5	12.5	8.8	13.8	312
Three times a week	18.4	11.5	14.8	5.0	12.9	178
Four times a week	8.2	6.3	12.3	1.1	7.3	436
More than four time a week	28.6	7.0	28.0	3.7	18.0	2423
n	657 (27%)	555 (23%)	674 (29%)	537 (21%)		

of playing computer games. Only 6.1% of the respondents watched <1 h of TV per day; 7.3% watched six or more hours per day. About a quarter of the children (27.2%) watched four or more hours per day. With regard to computer games, only 13.5% of the children never played games. About a quarter (25.3%) played computer games four or more times a week.

General linear models were used to estimate the differences between boys and girls and between the first and the fourth school year. With regard to television viewing, there were significant effects of both gender [$F(1,2540) = 82.98$, $P < 0.0001$] and school year [$F(1,2540) = 32.07$, $P < 0.0001$]. *Post-hoc* analyses indicated that boys watched significantly more television than girls did. In the first year, children watched significantly more television than in the fourth year. The difference between boys and girls was independent of school year. A similar linear model analysed the relationship among gender, school year and frequency of computer game play. Gender [$F(1,2419) = 671.08$, $P < 0.0001$], school year [$F(1,2419) = 59.79$, $P < 0.0001$] and the interaction between both variables [$F(1,2419) = 38.65$, $P < 0.0001$] were significant predictors of frequency of computer game play. Boys played more frequently than girls did. There was no difference between boys of the first and the fourth year, but girls in

the fourth year played significantly less often than the younger girls. There appeared to be a particular group of about 28% of the boys in both age groups who played computer games four or more times per week.

Meal skipping, faster eating and media use

To estimate whether a dose–response relationship exists between various levels of media use and meal skipping or faster eating, four separate logistic regression models were run. Meal skipping and faster eating in order to watch television or to play computer games were dichotomized into variables that were ‘one’ if that type of media related eating behaviour occurred at least once a week, and ‘zero’ if it occurred less frequently. Gender and school year were kept in the model as confounders only if they were significant. Odds ratios were estimated for each level (or ‘dose’) of media exposure with the lowest level as reference category.

Television

Meal skipping occurred more frequently only in respondents who reported watching five or more hours of television per day. The odds of skipping meals at least once a week were 2.6 times higher

Variable	Regression coefficient	SE	Odds ratio	95% CI of odds ratio	P-value
School year	0.47	0.14	1.6	1.23–2.10	0.001
Gender	0.30	0.14	1.35	1.03–1.79	0.032
0–1 h					0.000
1–2 h	–0.05	0.38	0.95	0.45–1.99	0.887
2–3 h	0.14	0.36	1.15	0.57–2.33	0.687
3–4 h	0.30	0.36	1.35	0.66–2.73	0.405
4–5 h	0.44	0.37	1.55	0.74–3.25	0.241
5–6 h	0.95	0.38	2.59	1.23–5.46	0.013
6 h and more	1.02	0.38	2.78	1.31–5.87	0.007
Constant	–0.2.98	0.34	0.05		0.000

CI, confidence interval.

Table 3 Logistic regression analysis for the relationship between television viewing and meal skipping

Figure 1 Odds ratio skipping a meal weekly for TV viewing.

for those who watched 5–6 h per day and 2.8 times higher for those who watched six or more hours per day (see Table 3 and Fig. 1).

Every extra hour of watching television per day was associated with significantly increased odds of eating faster to watch television compared with the reference category of respondents who watched <1 h of TV per day. Those who watched 1–2 h of

TV per day were 2.6 times more likely to eat faster to be able to watch TV at least once a week. There was a clear gradient in the odds ratios between 1 and 4 h a day. For those who watched four or more hours a day the odds ratio was very similar (around 6.6) (see Table 4 and Fig. 2).

Computer game play

Meal skipping as a result of computer game play did not gradually become more common when the frequency of playing started to increase. It only occurred more frequently in respondents who reported playing at least three times per week. The odds of skipping meals were 2.9 times higher for those who played about three times a week, 2.6 times higher for those who played about four times a week, and 8.9 times higher for those who played at least four times a week (see Table 5 and Fig. 3).

Eating faster due to computer game playing progressively became more prevalent when

Variable	Regression coefficient	SE	Odds ratio	95% CI of odds ratio	P-value
Gender	0.19	0.09	1.21	1.01–1.45	0.039
0–1 h					0.003
1–2 h	0.94	0.31	2.57	1.38–4.57	0.000
2–3 h	1.28	0.30	3.60	1.98–6.53	0.000
3–4 h	1.65	0.30	5.23	2.88–9.50	0.000
4–5 h	1.92	0.31	6.80	3.67–12.56	0.000
5–6 h	1.88	0.33	6.58	3.47–12.48	0.000
6 h and more	1.90	0.33	6.71	3.52–12.79	0.000
Constant	–2.45	0.30	0.09		0.000

CI, confidence interval.

Table 4 Logistic regression analysis for the relationship between television viewing and faster eating

Figure 2 Odds ratio of faster eating for TV viewing.

Figure 3 Odds ratio skips meal weekly for game play.

respondents played at least twice a week. Compared with the reference category of adolescents who never played, the odds of eating faster were 2.1 times higher for those who played at least two times a week. For adolescents who played more than four times a week, the odds of eating faster rose to 10.2 times higher (see Table 6 and Fig. 4).

Discussion

In present day society there are many threats to beneficial meal consumption patterns. A substantial number of factors have been shown to be at work influencing children to develop unhealthy eating habits (Parsons *et al.*, 1999; Kelder *et al.*, 1994; Burke *et al.*, 2001). Indirect evidence for an encouraging effect of food advertising on excessive caloric intake and consumption of foods with low nutritional value has been published (Story *et al.*, 2002). Lifestyle choices have been shown to encourage passivity and to lead to a reduction in energy expenditure (Hancox *et al.*, 2004; Graf

et al., 2004; Tremblay & Willms, 2003). On top of these and other influences, eating now has to compete for time with other activities. The current study identified television viewing and computer game play as two forms of media use regularly competing with meals for the scarce time available to adolescents. Every week about one adolescent in 10 skips at least one meal for either television viewing or computer game playing. Every week a quarter of the adolescents eat faster at least once to be able to watch a programme or to play a computer game.

One logical explanation for this finding is to assume a direct link between the time that is spent with the media and the time that should be spent with meals. As both television viewing (Krosnick *et al.*, 2003) and computer game play (Jansz, 2005) were argued to have a relatively strong appeal to certain adolescents, and these media can only be used in the morning and in the evening for the most part due to school hours and bedtimes,

Table 5 Logistic regression analysis for the relationship between computer game play and meal skipping

Variable	Regression coefficient	SE	Odds ratio	95% CI of odds ratio	P-value
School year	0.48	0.15	1.62	1.20–2.20	0.002
Never					0.003
At least once a month	–0.15	0.39	0.59	0.40–1.83	0.694
At least once a week	0.48	0.36	1.62	0.80–3.30	0.186
Twice a week	–0.16	0.43	0.85	0.37–1.99	0.716
Three times a week	1.05	0.35	2.88	1.46–5.68	0.002
Four times a week	0.96	0.39	2.62	1.23–5.61	0.013
More than four times a week	2.18	0.31	8.92	4.88–16.28	0.000
Constant	–3.53	0.31	0.03		0.000

CI, confidence interval.

Variable	Regression coefficient	SE	Odds ratio	95% CI of odds ratio	P-value
Never					0.000
At least once a month	0.07	0.24	1.07	0.40–1.83	0.758
At least once a week	0.44	0.24	1.56	0.80–3.30	0.062
Twice a week	0.75	0.23	2.11	0.37–1.99	0.001
Three times a week	1.44	0.22	4.21	1.46–5.68	0.000
Four times a week	1.64	0.24	5.16	1.23–5.61	0.000
More than four times a week	2.32	0.21	10.23	4.88–16.28	0.000
Constant	-2.20	0.19	0.11		0.000

CI, confidence interval.

Table 6 Logistic regression analysis for the relationship between computer game play and faster eating

Figure 4 Odds ratio faster eating at least weekly for game play.

television viewing and computer game playing may displace the time that is needed for other activities, such as having breakfast or dinner. Both meal skipping and faster eating can be seen as obvious markers of the presence of such a process. Although some have remarked that (in particular) television viewing often coincides with eating and snacking (Schmitt *et al.*, 2003), available time cannot expand infinitely, and media use during nonworking or out-of-school hours, therefore, is likely to displace other types of activities. Similarly, studies have indicated that the use of interactive and screen media regularly displaces time that otherwise would have been spent with reading or homework for school (Neuman, 1991; Muijs, 1997).

This study's findings on the relationship between media use and media-induced meal-time displacements support this explanation. Logistic regression analyses showed that higher levels of media use considerably increase the likelihood of

skipping meals or eating faster. While this result – those who spend much time with the media are more likely to spend time using media instead of eating – may appear tautological at first, it reveals some important dimensions of the issue. The findings put some of the significant effects of gender and school year into perspective. When indications of adolescents' overall media use were entered in the analyses, the effects of gender or school year on the prevalence of meal skipping or faster eating regularly became insignificant, and almost always appeared to be smaller than the effects of media use. Media-induced meal skipping or faster eating is a problem that is essentially related to heavy media use. Media-induced time displacement effects are not so much typical for boys or first-year students, but rather they are typical for those who spent much time with the media.

The associations between media use and time displacements work in different ways, however. With reference to eating faster to be able to watch television or to play computer games, the most important findings are: first, that it only occurs rarely in the category of adolescents who tend to use these media infrequently; and secondly, that it increasingly becomes a more prevalent practice in heavier users of the media. Skipping meals for media use, on the other hand, appears to be a rather common side effect of excessive patterns of media use.

Based on these results, an obvious solution for practitioners and educators who may wish to prevent these time displacement effects is to recommend parents limit the time their children spend with computer games and television.

Practitioners and educators themselves may use accounts of teenagers' media use to determine whether a teenager may be at risk of developing unhealthy meal consumption habits. For instance, when an adolescent boy's game playing habits can be classified in the category of 'five times or more per week', the likelihood of time displacement effects becomes high.

However, practitioners also may need to understand the family context of the adolescent. In most families, children, even adolescents, are not in full control of their media use or their meal consumption. Studies have described parental rule making and parental guidance of media use (Fujioka & Austin, 2003; Warren, 2003) and have referred to the monitoring and role modelling function of family meals (e.g. Neumark-Sztainer *et al.*, 2004; Eisenberg *et al.*, 2004). These investigations indicated that both an adolescent's meal consumption practices and his media use habits tend to be situated within a context of parental control. From that perspective, certain patterns of media use, as well as teenagers' inclination to skip meals or eat fast, may stem from how parents exert control over their adolescent children. According to this suggestion, the appeal of the entertainment media is not the cause of unhealthy or changing eating behaviours, but rather a symptom of a larger, and probably more complex, issue. In other words, an alternative explanation suggests that children are likely to use media during meal times, to skip meals, and to eat faster because the structure and the rules of the family to which they belong allow them to do so.

Both processes may well be involved simultaneously. On the one hand, the considerable appeal of the entertainment media is enticing children to displace time previously reserved for eating; on the other hand, family rules and (lack of) parental supervision are making it possible for them to kill healthier eating habits.

Recommending that parents forbid their children to eat faster or to skip a meal if the purpose is to watch TV or to play a computer game might, therefore, be an oversimplified approach. Meal skipping and faster eating are likely to be symptoms or expressions of the overall family atmosphere regarding eating and communal meals.

Adjusting eating behaviours to the requirements of television or computer game preferences reflects the way in which a family deals with eating issues. Therefore, rather than concentrating on the symptoms, one probably should manage the family's whole approach to eating in order to modify specific eating habits. Families wishing to change would have to be told that encouraging communal eating and making other activities subordinate to meals and meal times is more important than dealing with the symptoms. Additionally, they may be advised to reduce the amount of time spent with the media when their children display at-risk levels of media use.

These suggestions uncover the fairly narrow focus of this study as one of its limitations. Further research should include assessments of parental rule making and family meal habits. To explore systematically how media use and meal times are interrelated, self-reports may need to be replaced by diary or observational data collection methods. An additional limitation is the cross-sectional design which produces uncertainty regarding the sequence and causality of the observed associations. Longitudinal studies would strengthen the evidence regarding risk factors for time displacement effects.

In summary, we have described the frequency of adolescents' media use as a reason for reducing the amount of time they spent with meal consumption. The association of meal skipping and fast eating with the overall frequencies of media use presents opportunities for targeting this problem. Recommendations may include reducing the amounts of time spent with the media and promoting parental rule making on the subjects of both eating habits and media use.

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