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Maternal and best friends' influences on meal-skipping behaviours

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Abstract

Skipping meals is particularly common during adolescence and can have a detrimental effect on multiple aspects of adolescent health. Understanding the correlates of meal-skipping behaviours is important for the design of nutrition interventions. The present study examined maternal and best friends' influences on adolescent meal-skipping behaviours. Frequency of skipping breakfast, lunch and dinner was assessed using a Web-based survey completed by 3001 adolescent boys and girls from years 7 and 9 of secondary schools in Victoria, Australia. Perceived best friend and maternal meal skipping, modelling of healthy eating (eating healthy food, limiting junk food, eating fruit and vegetables) and weight watching were assessed. Best friend and maternal factors were differentially associated with meal-skipping behaviours. For example, boys and girls who perceived that their best friend often skipped meals were more likely to skip lunch (OR = 2.01, 95% CI 1.33, 3.04 and OR = 1.93, 95% CI 1.41, 2.65; $P < 0.001$). Boys and girls who perceived that their mother often skipped meals were more likely to skip breakfast (OR = 1.48, 95% CI 1.01, 2.15; $P < 0.05$ and OR = 1.93, 95% CI 1.42, 2.59; $P < 0.001$) and lunch (OR = 2.05, 95% CI 1.35, 3.12 and OR = 2.02, 95% CI 1.43, 2.86; $P < 0.001$). Educating adolescents on how to assess and interpret unhealthy eating behaviours that they observe from significant others may be one nutrition promotion strategy to reduce meal-skipping behaviour. The involvement of mothers may be particularly important in such efforts. Encouraging a peer subculture that promotes regular consumption of meals and educates adolescents on the detrimental impact of meal-skipping behaviour on health may also offer a promising nutrition promotion strategy.

Key words: Maternal influences: Best friends: Adolescents: Meal skipping: Breakfast: Lunch: Dinner

Nutrition plays a critical role in adolescent health and development. Adolescence is a time when the physiological need for a high nutritional quality diet is particularly important, not least because of the rapid growth (stature and weight) spurt experienced during this developmental phase^(1,2). However, adolescence is also a period of increased autonomy, and is often characterised by exploratory and sometimes unhealthy and erratic eating behaviours, such as meal skipping and snacking^(3,4). Skipping meals is particularly common during middle and late adolescence⁽⁴⁾. Breakfast is the meal most often skipped^(5,6). A number of studies have shown that girls are more likely to skip meals than are boys^(6–9). Skipping meals can have a significant impact upon adolescent health. For example, meal skipping is an unhealthy method of weight control⁽¹⁰⁾, is related to poorer diet quality and sub-optimal nutrient intakes^(11,12), can interfere with cognition and learning among children⁽¹³⁾, is associated with mental distress and impaired academic performance among adolescents⁽¹⁴⁾, and has been implicated in the development of obesity^(15,16). Furthermore, evidence suggests that eating habits and

behaviours during adolescence track into adulthood^(17,18). Given such evidence, decreasing the frequency of meal skipping among adolescents is an important target for nutrition interventions. In order to develop effective interventions aimed at reducing meal skipping, it is important to have a detailed understanding of the determinants of these behaviours.

Adolescents' eating behaviours are known to be strongly influenced by their social environments, which include family, friends and peer networks^(4,19). The family is a critical context for the development of eating behaviours, and parents play a key role in the establishment and maintenance of their child's eating behaviours^(4,20). Previous research has identified numerous pathways by which parents may shape the eating behaviours of their children. For example, a plethora of research has shown parental modelling of eating behaviours (e.g. consumption of fruit, vegetables and fats) to be a key determinant of adolescent consumption of these same foods^(19,21,22). In a recent review, parental breakfast eating and living in two-parent families were found to be the correlates most often associated with adolescents' breakfast

Abbreviation: YEP, Youth Eating Patterns.

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consumption. There is much less evidence, however, of the correlates of other meal-skipping behaviours^(23–25).

While research has shown that parental influence on health behaviours is maintained as children age and leave the home⁽²⁶⁾, the influence of friends and peers becomes increasingly salient⁽⁴⁾. Adolescents spend a substantial amount of time with friends, and some research has shown that adolescents report that the attitudes, encouragement and behaviours of friends and peers influence their food choice and eating behaviours^(27–30). Examining social influences on meal-skipping behaviours is difficult because adolescents may not be aware of these social influences. Furthermore, social influences on meal-skipping behaviours may be indirect, rather than direct^(4,31). For example, it could be hypothesised that adolescents who perceive that their mother or best friend eats a healthy diet are less likely to skip meals, because skipping meals is an unhealthy eating behaviour. Few studies, however, have examined such associations, and few studies have concurrently examined the relative associations of parental and best friends' characteristics with adolescent eating behaviours^(32,33), or examined meal-skipping behaviours other than breakfast. Therefore, the present study aimed to examine maternal and best friend correlates of skipping breakfast, lunch and dinner among adolescent boys and girls.

Methods

Study procedure

Data were drawn from the Youth Eating Patterns (YEP) study. In 2004 and 2005, all co-educational state (government) and Catholic secondary schools (years 7–12) with enrolments over 200, located in the southern metropolitan region of Melbourne and the non-metropolitan region of Gippsland, to the east of Melbourne, were invited to participate in the study. Of the seventy schools (forty-seven metropolitan and twenty-three non-metropolitan) that met these criteria, thirty-seven schools (twenty metropolitan and seventeen non-metropolitan) agreed to participate. The YEP survey is an online food habits survey and was administered by teachers during a class when students had access to computers. Study procedures were approved by the Ethics Committee of Deakin University and the Victorian Department of Education and Training and the Catholic Education Office. A detailed description of the YEP survey, participant recruitment and study procedures have been described in previous publications^(25,34).

Participants

All students (n 9842) from year 7 (aged 12–13 years) and year 9 (aged 14–15 years) from participating secondary schools were invited to complete the online survey. Teachers distributed parental consent forms via students, asking permission for their child to participate in the study. The consent form also asked parents to provide information about their family circumstances (e.g. marital status, education level, employment status, number of children). Parental consent was obtained for 4502 (46%) of all eligible students. Online surveys were

completed by 3264 adolescents (33%). Due to incomplete data on one or more of the variables of interest, 263 adolescents were excluded from analyses for the present study.

Measures

The YEP survey collected information on demographic characteristics of adolescents including date of birth, school year and sex.

Skipping meals

Meal skipping was assessed by asking adolescents how often over the past month they had: 'skipped breakfast', 'skipped lunch' and 'skipped dinner'. Possible responses were 'not in the last month', 'once/twice a month', 'once/twice a week', 'most days' or 'every day'. Frequencies for all responses are displayed in Table 1. Adolescents were categorised as 'skippers' if they reported skipping meals on 'most days' or 'every day'. Categories for 'skippers' have previously been used from this dataset; for consistency, the same cut points were used in the present study^(8,25).

Best friend and maternal factors

Adolescents were asked to provide a rating of their agreement with two questions about their best friends and the same two questions about their mother: 'my best friend/mother often skips meals' and 'my best friend/mother watches their weight'. Response options were given on a three-point Likert scale: (1) disagree, (2) not sure, (3) agree (see Table 1 for frequencies for all responses). Best friend/maternal skipping meals and best friend/mother watching their weight were collapsed into two groups: disagree/not sure *v.* agree.

Perceived modelling of healthy eating of best friends and mothers was assessed with items developed specifically for the present study. For each, the adolescent provided a rating of their agreement with four separate statements: 'my best friend/mother eats healthy food', 'limits junk foods', 'eats vegetables most days' and 'eats fruit most days' (1) disagree, (2) not sure or (3) agree (see Table 1 for frequencies for all responses). Each item was recoded as (1) agree and (0) disagree/not sure. Then, two variables were created by summing the four items (Cronbach's α = 0.77 for perceived modelling of healthy eating by best friend and Cronbach's α = 0.71 for perceived modelling of healthy eating by mother), and then dichotomising by the median into high and low modelling.

Statistical analysis

All analyses were conducted using Stata 11 (Stata Corporation, College Station, TX, USA, 2003). Descriptive statistics including frequencies, means and standard deviations were calculated for all study variables according to sex and year level of adolescent participants.

Bivariate logistic regression analyses (model 1) were conducted to examine associations between the best friend and maternal variables and adolescent meal skipping. All predictor

Table 1. Description of all variables before dichotomisation for analyses*

	Sex		School year	
	Boys (n 1390)	Girls (n 1611)	Year 7 (n 1835)	Year 9 (n 1166)
Skips breakfast (%)				
Not in the last month	61.1	45.4	54.6	49.6
Once/twice a month	14.2	16.8	14.6	17.2
Once/twice a week	9.5	14.4	12.1	12.2
Most days	11.3	18.1	14.6	15.4
Every day	3.9	5.3	4.1	5.6
Skips lunch (%)				
Not in the last month	58.9	49.2	55.0	51.8
Once/twice a month	20.6	21.7	20.4	22.6
Once/twice a week	10.6	15.6	13.3	13.3
Most days	7.6	10.9	9.1	9.6
Every day	2.3	2.6	2.2	2.7
Skips dinner (%)				
Not in the last month	87.6	80.5	86.6	79.3
Once/twice a month	7.9	12.2	8.3	13.3
Once/twice a week	2.3	5.2	2.8	5.3
Most days	1.2	1.3	1.5	0.9
Every day	1.0	0.8	0.8	1.2
Best friend often skips meals (%)				
Disagree	39.2	46.5	43.9	41.8
Not sure	45.0	30.9	37.6	37.2
Agree	15.8	22.6	18.5	21.0
Best friend eats healthy food (%)				
Disagree	12.2	12.9	9.9	16.8
Not sure	47.3	32.2	38.9	39.5
Agree	40.5	54.9	51.2	43.7
Best friend limits junk foods (%)				
Disagree	22.8	23.1	21.6	27.4
Not sure	51.7	42.3	48.3	44.1
Agree	25.5	34.6	30.1	28.5
Best friend eats vegetables most days (%)				
Disagree	13.4	11.9	12.2	13.2
Not sure	49.4	35.5	42.6	40.9
Agree	37.2	52.6	45.2	45.9
Best friend eats fruit most days (%)				
Disagree	13.7	14.5	13.1	15.7
Not sure	49.2	25.4	32.7	34.6
Agree	37.1	60.1	54.2	49.7
Best friend watches their weight (%)				
Disagree	23.3	23.4	20.7	27.6
Not sure	48.7	35.9	43.4	39.4
Agree	28.0	40.7	35.9	33.0
Mother often skips meals (%)				
Disagree	57.1	60.4	55.5	57.9
Not sure	27.7	24.2	25.9	25.8
Agree	15.2	15.4	18.6	16.3
Mother eats healthy food (%)				
Disagree	2.9	2.9	2.2	3.9
Not sure	15.3	14.3	14.3	15.5
Agree	81.8	82.8	83.5	80.6
Mother limits junk foods (%)				
Disagree	5.1	5.8	4.5	6.9
Not sure	18.9	17.7	18.1	18.5
Agree	76.0	76.5	77.4	74.6
Mother eats vegetables most days (%)				
Disagree	2.4	2.1	1.9	2.7
Not sure	12.5	7.1	9.2	10.2
Agree	85.1	90.8	88.9	87.1
Mother eats fruit most days (%)				
Disagree	4.7	5.6	4.4	6.3
Not sure	22.1	19.2	20.8	19.9
Agree	73.2	75.2	74.8	73.8
Mother watches her weight (%)				
Disagree	4.9	9.4	6.3	9.1
Not sure	30.6	29.3	29.2	31.1
Agree	64.5	61.3	64.5	59.8

* Skipping meals: adolescents were categorised as 'skippers' (of breakfast, lunch, dinner) if they reported skipping meals on 'most days' or 'every day' for analyses. Variables best friend/mother often skips meals and best friend/mother watches their weight were collapsed into two groups: disagree/not sure v. agree for analyses. Best friend and maternal modelling of healthy eating variables were created from the variables 'my best friend/mother eats healthy food', 'limits junk foods', 'eats vegetables most days' and 'eats fruit most days'. Each item was recoded as (1) 'agree' and (0) disagree/not sure. Two variables were then created by summing the four items (Cronbach's $\alpha = 0.77$ for perceived modelling of healthy eating by best friend and Cronbach's $\alpha = 0.71$ for perceived modelling of healthy eating by mother), and then dichotomising by the median into high and low modelling.

Table 2. Description of frequency of skipping meals and friend and maternal predictor variables by adolescent sex and year level†

	Sex		School year	
	Boys (n 1390)	Girls (n 1611)	Year 7 (n 1835)	Year 9 (n 1166)
Outcome variables (% skips)				
Skipping breakfast	15.1***	23.4***	18.7	19.0
Skipping lunch	9.9***	13.3***	11.4	12.2
Skipping dinner	2.2	2.0	2.1	2.1
Predictor variables				
Best friend often skips meals (% agrees)	15.8***	22.6***	18.5*	21.0*
Best friend models healthy eating (% high modelling)	28.5***	42.1***	37.2*	33.3*
Best friend watches their weight (% agrees)	28.0***	40.7***	36.0	33.0
Mother often skips meals (% agrees)	15.2	15.4	18.6	16.3
Mother models healthy eating (% high modelling)	78.0*	80.8*	80.9*	77.4*
Mother watches her weight (% agrees)	64.5	61.3	64.5**	59.8**

P*<0.05; *P*<0.01; ****P*<0.001.

† χ^2 test for examining differences in categorical variables by adolescent sex and year level.

variables that were significantly associated with meal skipping in the bivariate analyses were entered into multivariate logistic regression models (model 2). All regression models were stratified by sex and adjusted for age (year level) of adolescents, and accounted for potential clustering by school (unit of recruitment) using the ‘cluster’ command.

Results

Slightly more of the adolescent sample were girls (53%) and in year 7 of secondary school (61%). The mean age of adolescents was 13.2 (SD 1.6) years. Descriptives for each of the variables used in the present study before dichotomisation are presented in Table 1. Best friend and maternal predictor variables and patterns of meal skipping (outcome variables) are described in Table 2 according to adolescent sex and year level.

Tables 3–5 show the results of the bivariate and multivariate logistic regression analyses predicting adolescent breakfast, lunch and dinner skipping, respectively, stratified by sex. After adjusting for all significant variables from model 1, two variables remained significant among boys (model 2, Table 3) and four variables remained significant among girls (model 2, Table 3) with regard to breakfast skipping. Boys

and girls who reported high maternal modelling of healthy eating were less likely to skip breakfast, and those who agreed that their mother often skipped meals were more likely to skip breakfast (model 2, Table 3). Girls who agreed that their best friends often skipped meals were more likely to skip breakfast and girls who reported high best friend modelling of healthy eating had lower odds of skipping breakfast (model 2, Table 3).

After adjusting for all significant variables from model 1, two variables remained significant among boys and girls (model 2, Table 4) with regard to skipping lunch. Boys and girls who agreed that their best friend and mother often skipped meals were more likely to skip lunch (model 2, Table 4).

In the fully adjusted model (model 2), boys and girls who reported high levels of maternal modelling of healthy eating were less likely to skip dinner. Girls who agreed that their best friend often skipped meals were more likely to skip dinner (model 2, Table 5).

Discussion

The aim of the present study was to examine maternal and best friend correlates of meal-skipping behaviour among a sample of Australian adolescents. Results indicated that for

Table 3. Best friend and maternal predictors of skipping breakfast (Odd ratios and 95% confidence intervals)

	Skipping breakfast							
	Boys (n 1390)				Girls (n 1611)			
	Model 1†		Model 2‡		Model 1†		Model 2‡	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Best friend skips meals	1.27	0.86, 1.80			1.62***	1.25, 2.11	1.43**	1.09, 1.87
Best friend models healthy eating	0.81	0.54, 1.22			0.59***	0.47, 0.75	0.64***	0.49, 0.82
Best friend watches their weight	0.98	0.70, 1.36			1.03	0.82, 1.31		
Mother often skips meals	1.57**	1.08, 2.28	1.48*	1.01, 2.15	2.15***	1.61, 2.88	1.93***	1.42, 2.59
Mother models healthy eating	0.53***	0.40, 0.73	0.55***	0.40, 0.76	0.57***	0.43, 0.72	0.68**	0.51, 0.91
Mother watches her weight	0.89	0.66, 1.21			0.91	0.72, 1.15		

P*<0.05; *P*<0.01; ****P*<0.001.

† Model 1: bivariate logistic regression analyses of the association between single predictor and outcome variables (e.g. between mother often skips meals and adolescent breakfast skipping) controlling for school year, and accounting for potential clustering by school.

‡ Model 2: multivariate logistic regression analyses. Model 2 includes all predictor variables significantly associated with outcome variables in model 1 as well as controlling for school year, and accounting for potential clustering by school.

Table 4. Best friend and maternal predictors of skipping lunch (Odd ratios and 95% confidence intervals)

	Skipping lunch							
	Boys (n 1390)				Girls (n 1611)			
	Model 1†		Model 2‡		Model 1†		Model 2‡	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Best friend skips meals	2.10***	1.39, 3.18	2.01***	1.33, 3.04	2.15***	1.58, 2.92	1.93***	1.41, 2.65
Best friend models healthy eating	0.88	0.64, 1.19			0.69*	0.52, 0.93	0.77	0.57, 1.05
Best friend watches their weight	1.04	0.70, 1.54			1.06	0.79, 1.42		
Mother often skips meals	2.15***	1.42, 3.26	2.05***	1.35, 3.12	2.19***	1.56, 3.09	2.02***	1.43, 2.86
Mother models healthy eating	0.62	0.38, 1.03			0.71	0.49, 1.03		
Mother watches her weight	0.98	0.67, 1.41			1.01	0.76, 1.36		

P*<0.05; *P*<0.01; ****P*<0.001.

† Model 1: bivariate logistic regression analyses of the association between single predictor and outcome variables (e.g. between mother often skips meals and adolescent breakfast skipping) controlling for school year, and accounting for potential clustering by school.

‡ Model 2: multivariate logistic regression analyses. Model 2 includes all predictor variables significantly associated with outcome variables in model 1 as well as controlling for school year, and accounting for potential clustering by school.

boys and girls, perceived maternal meal-skipping behaviour was a consistent positive correlate of skipping breakfast and lunch. The present results further indicated that perceived maternal modelling of healthy eating may protect boys and girls from skipping breakfast and dinner. The present results are consistent with previous research that has shown that maternal modelling of eating behaviours is associated with adolescent eating patterns^(19,21,22), particularly restrictive eating behaviours such as fasting and skipping meals⁽³⁵⁾.

The present findings demonstrate that maternal correlates of meal-skipping behaviours are transferable to meals that are likely to be consumed without maternal presence (e.g. lunch). For instance, perceived maternal meal skipping may provide a lingering barrier to healthy eating for adolescents at lunchtime. This is consistent with Bandura's social learning theory which highlights that 'whilst most human behaviour is learnt through observational modelling, on later occasions this coded information serves as a guide for action'⁽³⁶⁾. Perceived maternal modelling of healthy eating behaviour, however, may only play a role in promoting healthy eating among adolescents when the mother is likely to be present for the meal

being consumed, since the present findings showed this correlate was primarily negatively associated with meal skipping at breakfast and dinner. It is also plausible that mothers who model healthy eating (e.g. by consuming fruit and vegetables most days) maintain healthy eating habits (e.g. eating dinner at the table) and a healthy lifestyle generally, and as such, make healthy food available and discourage meal-skipping behaviour. It is also possible that the present findings of an association between mother and adolescent meal-skipping behaviours may be reflective of certain lifestyle patterns whereby mothers who regularly skip meals may have chaotic family schedules where time and availability prevent meals from always being top priority for the family. Even though adolescents become more autonomous with age, the findings of the present study suggest that the influence of mother's eating behaviours on adolescent eating behaviours is important, for both boys and girls, even in environments where the mother may not be present. Given that mothers are key role models for eating and are the primary gatekeepers for food in the home^(37,38), nutrition interventions focusing on adolescents may be more effective if they also target mothers.

Table 5. Best friend and maternal predictors of skipping dinner (Odd ratios and 95% confidence intervals)

	Skipping dinner							
	Boys (n 1390)				Girls (n 1611)			
	Model 1†		Model 2‡		Model 1†		Model 2‡	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Best friend skips meals	1.97	0.88, 4.50			2.29*	1.13, 4.66	2.23*	1.09, 4.55
Best friend models healthy eating	1.22	0.63, 2.37			0.57	0.25, 1.30		
Best friend watches their weight	1.11	0.50, 2.44			1.21	0.60, 2.42		
Mother often skips meals	2.09	0.92, 4.78			1.80	0.80, 4.05		
Mother models healthy eating	0.31***	0.16, 0.62	0.31***	0.16, 0.62	0.46*	0.24, 0.88	0.48*	0.23, 0.96
Mother watches her weight	0.48	0.23, 1.08			0.74	0.37, 1.49		

P*<0.05; *P*<0.01; ****P*<0.001.

† Model 1: bivariate logistic regression analyses of the association between single predictor and outcome variables (e.g. between mother often skips meals and adolescent breakfast skipping) controlling for school year, and accounting for potential clustering by school.

‡ Model 2: multivariate logistic regression analyses. Model 2 includes all predictor variables significantly associated with outcome variables in model 1 as well as controlling for school year, and accounting for potential clustering by school.

Given that Australian adolescents regularly consume their lunch at school, it is unsurprising that those who perceived their best friends to skip meals were more likely to skip lunch. The present findings also show that adolescent girls who perceived their best friend to skip meals were also more likely to skip breakfast and dinner. The influence of peers on eating behaviours is well established in the literature. Previous research has indicated that the eating attitudes and behaviours maintained by friends and peers can influence adolescents' eating behaviours⁽³⁹⁾. Skipping meals is often a strategy employed for weight reduction, and it is possible that meal-skipping behaviour at lunch is symptomatic of a friendship/peer environment and subculture that emphasises the importance of weight control, joint-dieting and thinness. This is particularly true for girls, who are more likely to value and pursue a thin body as ideal, engage in disordered eating and interact within friendship groups that share similar eating and dieting behaviours^(40,41). There is increasing evidence, however, that adolescent boys are also concerned about their bodies and engage in disordered eating strategies, such as skipping meals^(42,43). The present results provided no evidence, however, that adolescents who perceived their best friend as 'watching their weight' were more likely to skip meals. It is possible that adolescents are able to identify specific and observable behaviour change strategies (i.e. skipping meals) more readily than a more general weight-related pursuit (i.e. 'watching their weight'), the latter possibly representing a more private position that is not as easily recognised between friends.

Perceived modelling of healthy eating by best friend was not associated with meal-skipping behaviours among boys. This finding is consistent with that of previous research^(33,44). The findings of the present study, however, showed that perceived modelling of healthy eating by best friend may protect girls from skipping breakfast. It is interesting that perceived modelling of healthy eating by best friends influenced girls' breakfast skipping behaviours, where best friends' presence is unlikely. As friendship groups often share similar eating attitudes and behaviours, and adolescents tend to gravitate towards those who share similar values and health behaviours to themselves, it is possible that girls who perceive their friends to have healthy eating habits maintain healthy eating habits themselves. Future research is warranted to further understand the sex differences in the role of best friend modelling of eating behaviours on adolescent meal skipping.

In considering these findings, it is important to acknowledge the limitations of the study. The reach of the whole study was low (46%); however, this is comparative to other large-scale longitudinal studies. The generalisability of the results is limited because our sample was drawn from schools in Victoria, Australia and so does not represent the population at large. The large number of adolescent boys and girls selecting 'not sure' response to many of the study questions may have had an impact on the results. All data were collected by self-report and are subject to socially desirable response bias or other misreporting. The cross-sectional study design does not permit causal inferences to be drawn. The strengths of the study include the large regionally diverse sample of

adolescents, consideration of both peer and family correlates of multiple meal behaviours.

Acknowledging its limitations, the findings of the present study are important, since little is known about the social influences on meal-skipping patterns of adolescents. Overall, the present results highlight that perceived maternal and best friend eating behaviours are important correlates of skipping meals among adolescent girls and boys. Educating adolescents on how to assess and interpret unhealthy eating behaviours that they observe from significant others may be one nutrition promotion strategy to reduce meal-skipping behaviour. The involvement of mothers is likely to be particularly important in such efforts. Encouraging a peer subculture that promotes regular consumption of meals and educates adolescents on the detrimental impact of meal-skipping behaviour on health may also offer a promising nutrition promotion strategy.

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