



Original article

Are family meals and social eating behaviour associated with depression, anxiety, and stress in adolescents? The EHDLA study



Desirée Victoria-Montesinos ^a, Estela Jiménez-López ^b, Arthur Eumann Mesas ^{b, c}, Rubén López-Bueno ^d, Miriam Garrido-Miguel ^{b, e}, Héctor Gutiérrez-Espinoza ^{i, **}, Lee Smith ^g, José Francisco López-Gil ^{b, f, h, *}

^a Faculty of Health Sciences, San Antonio Catholic University of Murcia, Murcia, Spain

^b Health and Social Research Center, Universidad de Castilla-La Mancha, Cuenca, Spain

^c Postgraduate Program in Public Health, Universidade Estadual de Londrina, Londrina, Brazil

^d Department of Physical Medicine and Nursing, University of Zaragoza, Zaragoza, Spain

^e Faculty of Nursing, Universidad de Castilla-La Mancha, Albacete, Spain

^f One Health Research Group, Universidad de Las Américas, Quito, Ecuador

^g Centre for Health, Performance and Wellbeing, Anglia Ruskin University, Cambridge, United Kingdom

^h Department of Environmental Health, Harvard University T.H. Chan School of Public Health, Boston, MA, USA

ⁱ Escuela de Fisioterapia, Universidad de las Américas, Quito, 170504, Ecuador

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SUMMARY

Objective: This study examined the association between family meals and social eating behaviour with depression, anxiety and stress symptoms among Spanish adolescents.

Methods: This was a cross-sectional study with data obtained from a representative sample of adolescents aged 12–17 years from *Valle de Ricote*, Murcia, Spain. Emotional symptomatology was evaluated with the Depression, Anxiety and Stress Scale. The frequency of family meals and social eating behaviour were self-reported.

Results: Each additional point in social eating behaviour decreased the probability of having a higher number of depressive (OR = 0.83; 95% CI, 0.75–0.92), anxiety (OR = 0.88; 95% CI, 0.80–0.97) and stress (OR = 0.90; 95% CI, 0.82–0.99) symptoms.

Conclusions: Higher social eating behaviour was associated with lower probabilities of higher number of depressive, anxiety and stress symptoms.

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1. Introduction

The World Health Organization (WHO) reported that in 2019, 970 million people globally had a mental disorder [1,2], with anxiety and depressive disorders being the most prevalent mental conditions and major causes of disability [3]. Adolescence is a period of multiple changes at the physical, cognitive and socio-affective levels, which could lead to greater vulnerability in the development of mental health problems [4]. Thus, approximately half of mental disorders develop by the age of 14, and more than 70% start by the age of 24 [5]. The presence of mental health symptoms in adolescence, even when they are subclinical, predicts

psychopathology in the future [6] and can lead to increased morbidity, mortality and disability [6,7]. For these reasons, there is an urgent call for interventions targeting the promotion of mental health in children and adolescents, both within and outside the school setting [8,9].

Mental health problems are multifactorial, with both genetic and environmental factors influencing their development [10]. The social determinants of mental health comprise different key domains, including economic, neighbourhood, environmental events, cultural and social domains (among others) [11,12]. In this sense, social determinants (i.e., interactions and relationships) may protect or increase the risk of mental disorders [11]. One factor closely related to social interaction is social eating behaviour, i.e., enjoyment/feelings related to eating with other people such as family and/or friends [13]. The social environment, which includes family, friends and the media, affects the modelling of eating behaviour in children and

* Corresponding author.

** Corresponding author.

E-mail address: josefranciscolepezgil@gmail.com (J.F. López-Gil).

adolescents, generating a certain relationship, feelings and emotions with food and with their body image [14]. Eating with other people increases the hedonic aspects of one's own experience, making it more pleasurable, as well as carrying out a behavioural mimicry, tracking its consumption [15]. Similarly, people modify their food intake according to perceived dietary norms and patterns [15]. Therefore, social interaction could be used to improve healthy eating behaviour [16], as well as mental health [17].

While some studies have examined the association between family meals and depression [18–20], anxiety [21–23] or stress [24,25], no study has examined the association between social eating behaviour and these outcomes in adolescents. Although they are closely related, there are important differences between family meals and social eating behaviour [13]. For example, family meals are not always eaten for pleasure and may be influenced by social norms imposed at home. Social eating behaviour, conversely, is more related to the enjoyment/feelings of eating meals in company (i.e., with friends or family). Furthermore, meals at home are usually eaten in the presence of family members, whereas social eating behaviour also takes into consideration friends (in addition to family). For these reasons, a distinction needs to be made between these different concepts. Hence, the aim of this study was to examine the relationship between family meals and social eating behaviour with depression, anxiety and stress symptoms in a representative sample of Spanish adolescents from the *Valle de Ricote* (Region of Murcia, Spain).

2. Methods

2.1. Design and study participants

This cross-sectional study analysed data from the Eating Healthy and Daily Life Activities (EHDLA) study, which included a representative sample of adolescents aged 12–17 years from the *Valle de Ricote* (Region of Murcia, Spain). Data were collected from three secondary schools during the 2021/2022 academic year. The detailed methodology of the EHDLA study has been previously published elsewhere [26]. A total of 649 adolescents (56.7% girls) were included in the present analyses.

Parents or legal guardians of the adolescents were required to sign a written informed consent form before the participants' could be recruited into the study. Additionally, both parents or legal guardians and their children received an information sheet explaining the aims of this research project and the tests and questionnaires administered. Moreover, adolescents were asked about their willingness to participate in the study. This study obtained ethical approval from the Bioethics Committee of the University of Murcia (ID 2218/2018) and the Ethics Committee of the Albacete University Hospital Complex and the Albacete Integrated Care Management (ID 2021–85).

2.2. Procedures

2.2.1. Depression, anxiety and stress (dependent variables)

Emotional symptomatology was evaluated by the Depression, Anxiety and Stress Scale (DASS-21) [27], which includes 21 symptoms scored on a 4-point Likert-type scale. The score of each item varies from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time and is divided uniformly into 3 subscales: depression, anxiety and stress). The Spanish version, which has adequate reliability, was used in this study [28]. The cut-off points established for the presence of depression, anxiety and stress were ≥ 6 points, ≥ 6 points and ≥ 5 points, respectively. This choice was made because of the optimal sensitivity and specificity shown by these cut-off points in adolescents [29].

2.2.2. Family meals (independent variable)

The frequency of family meals was assessed with the question "During the past 7 days, how many times did all, or most, of your family living in your house eat a meal together?". The response categories were (a) none, (b) 1 day, (c) 2 days, (d) 3 days, (e) 4 days, (f) 5 days, (g) 6 days and (h) 7 days [30]. This question was asked for breakfast, lunch and dinner independently. All the family meals were summed to obtain the weekly family meals.

2.2.3. Social eating behaviour (independent variable)

Social eating behaviour was evaluated by three different statements: "I enjoy sitting down with family or friends and eating a meal together"; "It is important to sit down and eat at least one meal a day with other people (family or friends)"; and "I usually eat dinner with other people". Response options are "strongly disagree", "somewhat disagree", "somewhat agree", or "strongly agree". These three items were summed to compute a social eating score (ranging from 3 to 12, Cronbach's $\alpha = 0.70$), with greater scores denoting higher social eating behaviour. These items have been previously used in the Project EAT (Eating and Activity over Time) [13].

2.2.4. Covariates

2.2.4.1. Sociodemographic. Sex and age were self-reported. Socioeconomic status (SES) was assessed by the Family Affluence Scale (FAS-III) [31]. The final score of the FAS-III ranges from 0 to 13 points.

2.2.4.2. Lifestyle. Physical activity and sedentary behaviour were assessed by the Youth Activity Profile Physical (YAP), which is a 15-item self-report instrument [32]. We used the Spanish version of YAP (YAP-S), which has been validated and adapted previously [33]. The YAP is a self-administered 7-day (previous week) recall questionnaire appropriate for use in young people aged 8–17 years. The items use a 5-point Likert scale and are separated into 3 sections [1]: activity at school [2], activity out-of-school and [3] sedentary habits [34]. Sleep duration was evaluated by asking respondents for weekdays and weekend days separately: "What time does your child usually go to bed?" and "What time does your child usually get up?". The average daily sleep duration was calculated for each adolescent as follows [(average nocturnal sleep duration on weekdays $\times 5$) + (average nocturnal sleep duration on weekends $\times 2$)]/7. Energy intake was computed through a self-administered food frequency questionnaire (FFQ), which was previously validated among the Spanish population [35].

2.2.4.3. Anthropometric. The body weight of the adolescents was measured with the subject barefoot and wearing light clothing using an electronic scale (with an accuracy of 0.1 kg) (Tanita BC-545, Tokyo, Japan), while height was determined by a portable height rod with an accuracy of 0.1 cm (Leicester Tanita HR 001, Tokyo, Japan). Body mass index (BMI) was calculated by dividing body weight (in kg) by height (in squared meters).

2.3. Statistical analysis

Means (M) and standard deviation (SD) or frequencies (n) and percentages (%) were reported for all quantitative or categorical variables, respectively. Variable normality distribution was verified with a Kolmogorov–Smirnov test with Lilliefors correction and the homogeneity of the variances with the Levene's test. Bivariate correlations between independent variables and DASS-21 scales (i.e., depression, anxiety and stress) were assessed by Spearman's rho (ρ). Since preliminary analyses showed no interaction between sex and social eating behaviour in relation to the DASS-21 mean

score (depression: $p = 0.718$; anxiety: $p = 0.450$; and stress: $p = 0.634$), we analysed both sexes together. Linear regression analyses were performed to estimate the association between social eating behaviour and DASS-21 scales. Due to the non-normal distribution of the depression, anxiety and stress scores, a nonparametric bias-corrected and accelerated (BCa) bootstrap method with 1000 samples was used. Binary logistic regression analyses were conducted to estimate the odds ratio (OR) and the 95% confidence interval (CI) of the association between social eating behaviour and depression (≥ 6 points), anxiety (≥ 6 points) and stress symptoms (≥ 5 points). Age, sex, socioeconomic status, body mass index, physical activity, sedentary behaviour, sleep duration and energy intake were included as covariates. All analyses were performed with SPSS software (IBM Corp, Armonk, NY, USA) for Windows (version 25.0). A p value < 0.05 was considered to establish statistical significance.

3. Results

Table 1 shows the characteristics of the study participants. The weekly mean of family meals was 12.8 ± 4.9 . The social eating behaviour (score) was 9.8 ± 1.8 . The proportions of participants with depression, anxiety and stress were 30.0%, 33.4% and 38.8%, respectively.

Bivariate correlations between independent variables and depression, anxiety, or stress (scores) are found in Table 2. The three scores presented a very low but statistically significant negative correlation with the social eating behaviour score (depression $\rho = -0.108$; anxiety $\rho = -0.084$; and stress $\rho = -0.121$) and with the number of family meals *per week* (depression $\rho = -0.101$; anxiety $\rho = -0.129$; and stress $\rho = -0.128$). Furthermore, considering the covariates included in the analyses, a low positive correlation was observed between the three scores and sex (girls) (depression:

$\rho = 0.239$; anxiety: $\rho = 0.342$; and stress: $\rho = 0.343$), and a very low negative correlation with the global sleep duration (minutes) (depression $\rho = -0.126$; anxiety: $\rho = -0.152$; and stress: $\rho = -0.158$). Finally, age (years) had a very low correlation with anxiety ($\rho = 0.104$) and stress ($\rho = 0.080$), but not with depression.

Table 3 depicts the association of family meals and social eating behaviour with the mean score of the different DASS-21 scales (i.e., depression, anxiety and stress). Depression, anxiety and stress (scores) were associated with social eating behaviour (depression: $B = -0.39$; BCa bootstrapped 95% CI, -0.62 to -0.14), anxiety ($B = -0.34$; BCa bootstrapped 95% CI, -0.60 to -0.10), and stress ($B = -0.25$; BCa bootstrapped 95% CI, -0.46 to -0.03), after adjusting by several covariates.

The associations of frequency of family meals and social eating behaviour and higher number of depressive (≥ 6), anxiety (≥ 6) and stress (≥ 5) symptoms are shown in Table 4. In adjusted analyses, the frequency of family meals showed a near-significant trend with a lower probability of reporting ≥ 6 anxiety symptoms, although no association was observed regarding depressive and stress symptoms. On the other hand, after adjusting for several covariates, our analyses showed that for each additional point in social eating behaviour there was a decrease in the probability of having a higher number of depressive (OR = 0.83; 95% CI, 0.75–0.92), anxiety (OR = 0.88; 95% CI, 0.80–0.97) and stress (OR = 0.90; 95% CI, 0.82–0.99) symptoms.

4. Discussion

This study examined the association of family meals and social eating behaviour with depression, anxiety and stress symptoms among Spanish adolescents. Overall, our findings show that higher social eating behaviour has a stronger association with lower depression, anxiety and stress symptoms compared to those associations observed for frequency of family meals. Although we found that family meals were inversely related to depression, anxiety and stress symptoms, the absence of statistical significance reinforces the importance of distinguishing between concepts, i.e., social eating behaviour and family meals [13].

Although we observed that family meals were inversely related to depressive symptoms, this association was not significant. This result is not in line with previous studies in the scientific literature [18,19,36]. However, it is necessary to emphasize that family meals are not necessarily the same as enjoying when eating with company (i.e., family, friends). Sometimes, family meals could be imposed, and adolescents could follow food rules to please their relatives and have a perception of belonging to a family group [37], which may not always result in a pleasant feeling towards the situation. This fact could (at least in part) explain this absence of statistical significance. Notwithstanding, mounting evidence has shown that the family environment is essential for the proper development of eating behaviour in children and adolescents [38,39].

Our findings show that social eating behaviour is inversely related to depression symptoms. To our knowledge, while it has previously been reported an association between family meals and depressive symptomatology among young people [40,41], this is the first study examining the association between social eating behaviour and depressive symptoms in adolescents. One possible reason explaining our findings could lie in feeling a sense of belonging. It is possible that adolescents who enjoy, perceive a greater importance of, or have more frequent social meals even outside the family context may have a greater sense of belonging to the group, which is a central human motivation that has implications for well-being and mental health [42]. Another possible reason is that protection and support from family/peers may help and protect adolescents against depression symptoms [20].

Table 1
Descriptive data of the analysed sample (n = 649).

Variables	M (SD)/n (%)
Sociodemographic	
Age (years)	14.0 (1.5)
Sex	
Boys	281 (43.3)
Girls	368 (56.7)
FAS-III (score)	8.1 (2.1)
Lifestyle	
YAP-S physical activity (score)	2.6 (0.7)
YAP-S sedentary behaviour (score)	2.6 (0.6)
Sleep duration (min)	493.2 (54.0)
Energy intake (kcal/d)	3002.4 (2019.6)
Anthropometric	
Weight (kg)	59.4 (15.0)
Height (cm)	161.1 (8.6)
BMI (kg/m ²)	22.7 (4.7)
Family meals frequency	
Breakfast (meals/week)	2.0 (2.4)
Lunch (meals/week)	5.4 (2.2)
Dinner (meals/week)	5.4 (2.2)
Total (meals/week)	12.8 (4.9)
Social eating behaviour	
Social eating behaviour (score)	9.8 (1.8)
DASS-21	
Depression (score)	4.7 (5.2)
Depression symptoms ≥ 6 points, n (%)	209 (32.2)
Anxiety (score)	4.3 (4.7)
Anxiety symptoms ≥ 6 points, n (%)	231 (35.6)
Stress (score)	5.5 (4.8)
Stress symptoms ≥ 5 points, n (%)	269 (41.4)

Data are expressed as the mean (standard deviation) or count (percentages). BMI, body mass index; DASS-21, Depression, Anxiety and Stress Scale-21; FAS-III, Family Affluence Scale-III; YAP-S, Spanish Youth Active Profile.

Table 2
Bivariate correlations between independent variables and different scales of DASS-21 (depression, anxiety and stress).

Variables	Depression (score)	Anxiety (score)	Stress (score)
<i>Main predictors</i>			
Social eating behaviour (score)	−0.108*	−0.084*	−0.121*
Family meals (times per week)	−0.101*	−0.129*	−0.128*
<i>Covariates</i>			
Age (years)	0.037	0.104*	0.080*
Sex (1 = Boys; 2 = Girls)	0.293**	0.342**	0.343**
FAS-III (score)	−0.026	−0.027	−0.050
BMI (kg/m ²)	0.035	0.019	0.033
YAP-S PA (score)	−0.042	−0.063	−0.056
YAP-S SB (score)	0.030	−0.019	0.016
Sleep duration global (minutes)	−0.126*	−0.152**	−0.158**
Energy intake (kcal)	0.031	0.065	0.041

Data are expressed as Spearman's rho (ρ). BMI, body mass index; FAS-III, Family Affluence Scale-III; PA, physical activity; SB, sedentary behaviour; YAP-S, Spanish Youth Active Profile. * $p < 0.05$; ** $p < 0.001$.

Moreover, we found that social eating behaviour was also associated with lower odds of reporting anxiety symptoms. Consistent with our findings, some studies have reported an inverse association between family meals and anxiety symptoms [21,22]. Another study in Korean children reported that eating without family was related to anxiety (among other mental disorders) [23]. One possible explanation is that family routines and rituals seem to promote secure family relationships, which are fundamental for the proper mental development of adolescents [43]. Furthermore, enjoying meals with friends and family can allow for a relaxed atmosphere where experiences, problems, experiences, etc., can be shared [44], which may improve quality communication with peers/family. Supporting this notion, lower quality communication has been associated with social anxiety among adolescents [45]. In addition, low peer acceptance has been

significantly associated with increased social anxiety among youths [46]. It seems reasonable that adolescents who are more predisposed to eating in company have greater peer acceptance, which in turn protects against anxiety symptoms. However, caution is needed to interpret this hypothesis because of reverse causation (i.e., those with anxiety symptoms could not want to socialise and eat with family/members or friends).

Concerning stress symptoms, we found that higher social eating behaviour was inversely related to this condition. This result seems to agree with a previous study among 2379 adolescent girls, which indicated that family meals can offer the opportunity to see the parents' model of positive coping through problem-focused coping, learning healthier coping strategies to deal with social pressure and thus reducing stress symptoms [24]. To cope with stress, adolescents may seek support from family or friends more often than emotional venting or withdrawal. It is possible that in relaxed and favourable environments such as those made possible by meals in company with peers or family, problems or concerns (e.g., different facets of school life [47]) can be exchanged to help reduce the symptoms of stress. Similarly, peers/family relationships seem to exert an important role in the behavioural adjustment of adolescents, protecting them against some negative consequences of stressful life events adolescence [25]. We hypothesised that higher-quality peer/family members relationships (including meals in their company) may lead to lower odds of stress symptoms.

This study is not without limitations. First, since this was a cross-sectional study, we are not able to establish cause and effect associations. Indeed, it is not known whether eating behaviours drives mental health problems or vice versa. It is likely bi-directional. Second, our results are adjusted for the confusion effect of covariates, some of them correlated with the outcomes analysed (i.e., depression, anxiety and stress), such as age, sex and overall sleep duration. However, residual confounding is still possible. Additionally, the self-report questionnaires used in this study may lead to social desirability and recall bias. Conversely, this study has some strengths that should be acknowledged. For instance, this study was conducted with a representative sample of adolescents of the *Valle de Ricote* (Region of Murcia, Spain), which allowed us to achieve adequate statistical power and to analyse social eating behaviour and its relationship with mood disorders. In addition, to date, this is the first study assessing the relationship between social eating behaviour and depression, anxiety and stress among adolescents.

In conclusion, our results show that social eating behaviour in adolescents is more strongly associated with depression, anxiety and stress symptoms than family meals. Therefore, it is possible

Table 3
Analyses of linear regression between family meals or social eating behaviour and different scales of DASS-21 (depression, anxiety and stress).

Potential predictors	B	SE	LLCI	ULCI	p
Depression (score)					
Family meals (per one meal) ^a	−0.12	0.04	−0.21	−0.02	0.007
Family meals (per one meal) ^b	−0.06	0.04	−0.14	0.03	0.193
Social eating behaviour (per one point) ^a	−0.49	0.13	−0.75	−0.22	<0.001
Social eating behaviour (per one point) ^b	−0.39	0.12	−0.62	−0.14	0.004
Anxiety (score)					
Family meals (per one meal) ^a	−0.10	0.04	−0.17	−0.03	0.011
Family meals (per one meal) ^b	−0.06	0.04	−0.14	0.02	0.093
Social eating behaviour (per one point) ^a	−0.38	0.12	−0.61	−0.13	0.002
Social eating behaviour (per one point) ^b	−0.34	0.12	−0.60	−0.10	0.005
Stress (score)					
Family meals (per one meal) ^a	−0.12	0.04	−0.20	−0.05	0.002
Family meals (per one meal) ^b	−0.07	0.04	−0.14	0.01	0.062
Social eating behaviour (per one point) ^a	−0.29	0.12	−0.54	−0.05	0.020
Social eating behaviour (per one point) ^b	−0.25	0.11	−0.46	−0.03	0.031

^a Unadjusted. ^b Adjusted by sex, age, socioeconomic status, body mass index, physical activity, sedentary behaviour, sleep duration and energy intake. B, unstandardised coefficients; SE, standard error; LLCI, lower limit confidence interval, ULCI, upper limit confidence interval. Note: nonparametric bias-corrected and accelerated (BCa) bootstrap with 1000 resamples was applied.

Table 4
Analyses of binary logistic regression between family meals or social eating behaviour and depression, anxiety and stress symptoms.

Potential predictors	Unadjusted			Adjusted		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Depression symptoms (≥ 6 points)						
Family meals (per one meal)	0.97	0.93–1.00	0.040	0.98	0.95–1.02	0.317
Social eating behaviour (per one point)	0.83	0.76–0.91	<0.001	0.83	0.75–0.92	<0.001
Anxiety symptoms (≥ 6 points)						
Family meals (per one meal)	0.96	0.93–1.00	0.026	0.97	0.94–1.01	0.110
Social eating behaviour (per one point)	0.89	0.81–0.97	0.012	0.88	0.80–0.97	0.011
Stress symptoms (≥ 5 points)						
Family meals (per one meal)	0.97	0.94–1.00	0.061	0.98	0.95–1.02	0.321
Social eating behaviour (per one point)	0.91	0.83–0.99	0.036	0.90	0.82–0.99	0.029

Adjusted for sex, age, socioeconomic status, body mass index, physical activity, sedentary behaviour, sleep duration and energy intake. CI, confidence interval; OR, odds ratio.

that nutritional education (i.e., raising awareness of the importance of social eating behaviour) may lead to decreased odds of reporting depression, anxiety and stress symptoms. Furthermore, one of the most relevant practical applications of this study is that promoting social eating behaviour by regular meals with peers in addition to family members may lead to psychosocial and well-being benefits [48]. As a public health message, social eating behaviour should be promoted, as it may lead to not only nutritional but also mental health benefits.

Author contributions

JFL-G designed the study. JFL-G contributed to the interpretation and analysis of the data. DV-M wrote of the initial draft. EJ-L, AEM, RL-B, MG-M, HG-E, LS and JFL-G contributed to the revision of the manuscript. All authors approved the final version of the manuscript.

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Conflict of interest

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