



Are there protective associations between family/shared meal routines during COVID-19 and dietary health and emotional well-being in diverse young adults?

Jerica M. Berge^{a,*}, Vivienne M. Hazzard^{b,c,d}, Nicole Larson^c, Samantha L. Hahn^{c,d}, Rebecca L. Emery^e, Dianne Neumark-Sztainer^c

^a University of Minnesota Medical School, Department of Family Medicine and Community Health, Minneapolis, MN, USA

^b Sanford Center for Biobehavioral Research, Fargo, ND, USA

^c University of Minnesota School of Public Health, Division of Epidemiology and Community Health, Minneapolis, MN, USA

^d University of Minnesota Medical School, Department of Psychiatry & Behavioral Sciences, Minneapolis, MN, USA

^e University of Minnesota Medical School, Duluth Campus, Department of Family Medicine and Biobehavioral Health, Duluth, MN, USA

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ABSTRACT

Background: This study examined who is engaging in family/shared meals and associations between family/shared meal frequency and home food availability, dietary consumption, and emotional well-being among young adults during the COVID-19 pandemic.

Methods: A rapid-response online survey was sent to participants in a ten-year longitudinal study (Eating and Activity over Time: EAT 2010–2018). A total of 585 young adults (mean age = 24.7 ± 2.0 years, 63.3% female) living with at least one family member completed the COVID-EAT (C-EAT) survey during the U.S. outbreak of COVID-19. Items assessed changes in family/shared meal frequency, eating behaviors, and emotional well-being. Regression models adjusting for sociodemographic characteristics examined associations between family/shared meal frequency and home food availability, dietary consumption, and emotional well-being.

Results: Participants reported an average of 4.6 ± 3.4 family/shared meals per week during COVID-19, a 0.5 meal/week increase from prior to the pandemic ($p = .002$). Family/shared meal frequency during COVID-19 differed by race/ethnicity, with Asian American participants being most likely to report only 1–2 family/shared meals per week. Family/shared meals during COVID-19 were associated with higher vegetable intake, greater availability of fruits, vegetables, and whole wheat bread in the home, lower levels of depressive symptoms and perceived stress, and greater perceived ability to manage stress in young adults.

Conclusions: Results suggest that engaging in a regular routine, such as family/shared meals, during COVID-19 may have protective associations with dietary health and emotional well-being for young adults. Results may inform practices/routines to offer protective benefits during public health crises such as the current pandemic.

1. Introduction

Prior research suggests that engaging in family meals (e.g., meals eaten with family members living in the same household) or shared meals (e.g., meals eaten with roommates, significant others, or others living within the same household) may be protective for the entire family or household (Fruh et al., 2011; Larson et al., 2010; Fulkerson et al., 2014). For example, past studies have shown associations between family meal frequency and more healthful dietary intake for children (Fulkerson et al., 2014; Horning et al., 2016; Fulkerson et al., 2018;

Neumark-Sztainer, 2005; Christian et al., 2013), adolescents (Fulkerson et al., 2014; Utter et al., 2013; Utter et al., 2008; Larson et al., 2007; Fulkerson et al., 2009; Fulkerson et al., 2008; Neumark-Sztainer et al., 2010; Utter et al., 2013), young adults (Fulkerson et al., 2014; Larson et al., 2007; Larson et al., 2009; Larson et al., 2009; Berge et al., 2018), and parents (Fulkerson et al., 2014; Berge et al., 2018; Berge et al., 2012; Utter et al., 2018). In addition, family meal quantity and quality (i.e., emotional atmosphere, healthfulness of meal) has been shown to be associated with reduced risk for overweight/obesity in children (Horning et al., 2016; Berge et al., 2014), adolescents (Berge et al., 2013),

Abbreviations: COVID, corona virus disease.

* Corresponding author at: Department of Family Medicine and Community Health, 717 Delaware Street SE, Room 425, Minneapolis, MN 55414, USA.

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young adults (Berge et al., 2015), and parents (Fulkerson et al., 2014); however, not all associations have been consistent (Fulkerson et al., 2008; Goldfield et al., 2011). Family meal frequency has also been associated with less unhealthy weight control behaviors in adolescents (Neumark-Sztainer et al., 2010; Fulkerson et al., 2006; Neumark-Sztainer et al., 2004) and emerging young adults (Neumark-Sztainer et al., 2008) and with higher emotional well-being and family connectedness/communication in children (Horning et al., 2016; Fulkerson et al., 2018; Dallacker et al., 2018; Dallacker et al., 2019; Robson et al., 2020), adolescents (Utter et al., 2013; Fulkerson et al., 2009; Neumark-Sztainer et al., 2010; Fulkerson et al., 2006; Robson et al., 2020; Eisenberg et al., 2004; Fulkerson et al., 2010; Fulkerson et al., 2007; do Amaral e Melo et al., 2020), and parents (Utter et al., 2018). Furthermore, research examining shared meals with roommates or others living in the same household have shown associations between shared meal frequency and more healthful dietary intake and emotional well-being in young adults (Larson et al., 2013). Given these protective associations, it is important to examine the frequency of family/shared meals during COVID-19 to determine whether these protective associations are also present during a public health crisis such as a pandemic. Understanding practices/routines that may be protective during public health crises may be useful for the current pandemic and other future public health crises.

Media reports (Redmond, 2020) suggest that the stay-at-home and social distancing orders during the COVID-19 pandemic may have increased the frequency of engaging in family/shared meals, given more opportunities for being together as a family or household. However, to the best of our knowledge, there are no published findings to date verifying this observation, nor is it clear who is engaging in family/shared meals or the frequency in which family/shared meals are occurring. Engaging in family/shared meals during a highly stressful time such as the COVID-19 pandemic may provide regular opportunities for members of the household to come together to be nourished both physically (i.e., healthful dietary intake) as well as emotionally (i.e., communicate/connect about what is happening in their lives and the world around them). However, it is unknown whether engaging in family/shared meals during the COVID-19 pandemic is associated with more healthful dietary consumption or emotional well-being. For example, while prior research has demonstrated that family/shared meals are associated with higher levels of emotional well-being (Neumark-Sztainer et al., 2010; Berge et al., 2018; Utter et al., 2018; Fulkerson et al., 2006; Eisenberg et al., 2004; Fulkerson et al., 2007), and thus might be expected to provide similar benefits during the COVID-19 pandemic, it is also possible that engaging in a family/shared meals during the COVID-19 pandemic may not provide emotional well-being, given the high stress levels occurring during the COVID-19 pandemic and the maladaptive coping skills that have been reported (e.g., increased substance use) (Lechner et al., 2020; Leeb et al., 2020; Prime et al., 2020). In addition, prior research has shown that having regular family/shared meals is associated with an increased likelihood of having more healthful food availability (e.g., fruits and vegetables in the refrigerator) and accessibility (e.g., cut up fruits and vegetables in a grab bag that is easily seen in the refrigerator) (Story et al., 2008; Loth et al., 2016). However, during COVID-19 it is unknown how the relationship between family/shared meals and the home food environment has been affected. It is possible that maintaining a healthful home food environment is more difficult given the stay-at-home and social distancing orders that have created more grocery shopping difficulties and restrictions.

Understanding more about family/shared meal practices during the COVID-19 pandemic will inform public health efforts for current and future responses to the ongoing pandemic, as well as for future public health crises. Thus, the main research questions for the current study include: (1) what is the frequency of family/shared meals during the COVID-19 pandemic?; (2) who is having family/shared meals during the COVID-19 pandemic?; (3) has the frequency of family/shared meals

increased during the COVID-19 pandemic?; (4) Is the frequency of family/shared meals during the COVID-19 pandemic associated with more healthful home food availability, healthful dietary consumption, and emotional well-being in young adults? Results from this study will identify potential factors (i.e., family/shared meal routines) that may be protective during critical incidences such as the current pandemic and future public health crises.

Our study is guided by the Family Stress Theory (Utter et al., 2013) which indicates that when families and individual members within the family system undergo stress they respond through adaptability and resilience by using resources including routines and patterns (e.g., family meals) to minimize or resolve the stressor. In the current study, the overall hypothesis is that engaging in regular family meals (i.e., routines) during the COVID-19 pandemic (i.e., significant societal stressor) will be associated with more healthful dietary intake, home food availability, and emotional well-being (i.e., adaptability).

2. Methods

2.1. Study design and sample

Participants in the C-EAT (COVID-19 - Eating and Activity over Time) study were members of the EAT 2010–2018 longitudinal study cohort and invited to complete a follow-up, online survey in 2020 during the U.S. outbreak of COVID-19. The EAT 2010–2018 study is a population-based investigation of eating, activity, and weight-related behaviors and associated factors among young people who were attending secondary school in Minneapolis-St. Paul, Minnesota in 2009–2010 (Arcan et al., 2014; Larson et al., *in press*). The C-EAT survey was designed to capture changes in health behaviors and markers of psychosocial well-being during the COVID-19 pandemic. Invitations and reminders to participate in the online C-EAT survey were sent by email and text message during the months of April to October 2020 to the 1,568 cohort members who had completed the most recent follow-up survey in 2017–2018. Responses were received from 720 participants (46% of the sample). Most survey respondents (90%) were living in Minnesota at the time they completed the C-EAT 2020 survey. The University of Minnesota Institutional Review Board Human Subjects Committee approved all protocols.

Analyses in the present study were restricted to a subsample of C-EAT participants who lived with at least one family member during the COVID-19 pandemic ($N = 585$). In this subsample, 55.6% of participants lived with their parent(s), 38.6% lived with their significant other, 29.2% lived with their sibling(s), 20.9% lived with their own child(ren), 3.8% lived with roommate(s)/friend(s), and 2.4% lived with other family (extended family, in-laws).

Respondents in the C-EAT 2020 sample were from sociodemographically diverse backgrounds. Specifically, the analytic sample was 63.3% female, 35.6% male, and 1.2% gender minorities, with a mean age of 21.9 ± 2.0 years at EAT 2018 and 24.7 ± 2.0 years at C-EAT in 2020. Ethnic/racial backgrounds as reported by participants were 26.3% white, 26.3% Asian American (primarily Hmong refugees), 18.0% Hispanic, 18.0% African American or Black, and 11.5% mixed or other. The distribution across categories of parental SES based primarily on baseline educational attainment was: 34.3% low, 20.7% low-middle, 18.3% middle, 16.9% upper-middle, and 9.8% high.

2.2. Survey measures

The C-EAT survey was based on prior EAT surveys (Larson et al., 2013), with modifications made to focus recall on the past month of events related to the COVID-19 outbreak. Test-retest reliability of measures was examined at EAT 2018 using data from 112 participants who completed the survey twice over 3 weeks. All measures used in C-EAT are shown in Table 1.

Table 1
Measures used in the current study examining family/shared meal frequency and home food availability/accessibility, dietary consumption, and emotional well-being.

Measure	Time Point Survey Item is Used in Analysis	Description
Family Meal Frequency	EAT 2018 and C-EAT	Family meal frequency was assessed at EAT 2018 and C-EAT with the question, "During the past seven days, how many times did all, or most, of the people living in your household eat a meal together?". (Berge et al., 2012) Response options were: <i>never</i> , <i>1–2 times</i> , <i>3–4 times</i> , <i>5–6 times</i> , <i>7 times</i> , and <i>more than 7 times</i> (test–retest $r = 0.66$). Responses were categorized into 0 times a week, 1–2 times a week, 3–4 times a week, 5–6 times a week or 7 or more times a week. To also examine the number of family meals per week as a continuous variable, a response of 0 times a week was coded as 0, 1–2 times a week was coded as 1.5, 3–4 times a week as 3.5, 5–6 times a week as 5.5, 7 times a week as 7 and more than 7 times a week as 10.
Home Food Availability and Accessibility	C-EAT	Home food availability was assessed in the C-EAT survey by asking how often the following were true over the past month in one's home: "Fruits and vegetables are available," "Vegetables are part of the dinner meal," "There is fresh fruit on the counter, table or somewhere else where I can easily get it," "There are ready-to-eat vegetables in the fridge," and "Whole wheat bread is available." (Larson et al., 2020) Response options were <i>never</i> , <i>sometimes</i> , <i>usually</i> , and <i>always</i> . Consistent with previous Project EAT research (Larson et al., 2021; Mason et al., 2018; Berge and MacLehose, 2013), responses were dichotomized to <i>usually/always</i> or <i>sometimes/never</i> for analyses (test–retest agreement range $r = 0.70–0.80$) in order to represent whether or not the respective food groups were regularly available/accessible in the home.
Dietary Consumption	C-EAT	<u>Fruit and vegetable intake</u> were assessed in the C-EAT survey with the following two questions: "Thinking back over the past week, how many servings of fruit did you usually eat on a typical day? (A serving is half a cup of fruit or 100% fruit juice or a medium piece of fruit)" and "Thinking back over the past week, how many servings of vegetables did you usually eat on a typical day? (A serving is half a cup of cooked vegetables or 1 cup of raw vegetables)." (Berge et al., 2015) Response options for each item were 0, less than 1, 1, 2, 3, 4, 5 or more servings/day. Responses were coded numerically as 0, 0.5, 1, 2, 3, 4, and 5.5. <u>Sugar-sweetened beverage consumption</u> was assessed with the question,

Table 1 (continued)

Measure	Time Point Survey Item is Used in Analysis	Description
Psychological Well-being	C-EAT	"Thinking back over the past week, how often did you drink sugar-sweetened beverages (regular soda or pop, Kool-Aid)?" (Kandel and Davies, 1982) Response options were: <i>less than once per week</i> ; <i>1 drink per week</i> , <i>2–4 drinks per week</i> , <i>5–6 drinks per week</i> , <i>1 per day</i> , or <i>2 or more per day</i> . Responses were coded numerically as 0, 1, 3, 5.5, 7, and 14, then divided by 7 for daily sugar-sweetened beverage intake. <u>Frequency of eating food from fast food restaurants</u> (include take-out and delivery) over the past month was assessed separately for burger-and-fries, pizza, and other fast food categories. Response options were <i>never/rarely</i> , <i>1–3 times per month</i> , <i>1–2 times per week</i> , <i>3–4 times per week</i> , <i>5–6 times per week</i> , and <i>1 + times per day</i> . Responses were coded numerically as 0, 2, 6, 14, 22, and 28 times per month (test–retest r range: 0.57–0.70). <u>Depressive symptoms</u> were assessed in the C-EAT survey with a six-item scale originally developed by Kandel and Davies (Nelson et al., 2008) but modified to focus on the past month. Responses from 1 (<i>not at all</i>) to 3 (<i>very much</i>) were averaged, and the average was multiplied by ten. Possible scores ranged from 10 to 30, with higher scores indicating higher depressive symptoms ($\alpha = 0.87$; test–retest $r = 0.71$). <u>Perceived stress</u> was measured with an item asking participants to rate their average level of stress in the past 30 days, with response options ranging from 1 (<i>not at all stressed</i>) to 10 (<i>very stressed</i>) (test–retest $r = 0.69$), and <u>perceived ability to manage stress</u> was measured with an item asking participants to rate their ability to manage stress in the past 30 days, with response options ranging from 1 (<i>ineffective</i>) to 10 (<i>effective</i>) (Errisuriz et al., 2016; Yuan et al., 2017) (test–retest $r = 0.50$).
Sociodemographic Characteristics	EAT 2018	<u>Structurally racialized categories</u> labeled as ethnicity/race (test–retest agreement range: 98–100%) and <u>socioeconomic status</u> (SES; test–retest $r = 0.90$) were measured on the original school-based survey in 2009–2010 (Larson et al., 2013; Feskanich et al., 1993; Blumberg et al., 1999). <u>Gender</u> (test–retest agreement: 100%), age (test–retest $r = 0.99$), temporary lay-off due to the COVID-19 situation, and past-year household food security (Hardeman et al., 2018), were measured in the C-EAT survey. Young people from diverse racial/ethnic and low socio-economic backgrounds may have more adverse health consequences due

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Table 1 (continued)

Measure	Time Point Survey Item is Used in Analysis	Description
		to factors related to racism and social inequities, such as fewer resources aimed at health promotion, therefore it is important to assess both race/ethnicity and socio-economic status (SES) (Hardeman et al., 2017; Hardeman et al., 2016).

2.3. Statistical analysis

Descriptive analyses were performed to describe the study sample. Differences in family/shared meal frequency during the COVID-19 pandemic by sociodemographic characteristics were examined with one-way analyses of variance (ANOVAs) and *t*-tests when examining number of family meals as a continuous variable and with chi-square tests when examining family/shared meal frequency as a categorical variable. A repeated measures ANCOVA adjusted for age, gender, ethnicity/race, and socioeconomic status was conducted to examine changes in the number of family/shared meals from EAT 2018 to C-EAT in a subset of 437 participants who also lived with at least one family member at EAT 2018. A linear regression model adjusted for age, gender, ethnicity/race, and socioeconomic status was also conducted to calculate the predicted mean number of family/shared meals per week at C-EAT for each level of family/shared meal frequency at EAT 2018 in this subset of participants to describe patterns of change. Regression models examined associations of categorical family/shared meal frequency (independent variable) with home food availability, dietary consumption, and psychological well-being (dependent variables) during the COVID-19 pandemic. Models for home food availability used logistic regression, and models for dietary consumption and psychological well-being used linear regression. All regression models were adjusted for age, gender, ethnicity/race, and SES to account for potential confounding. Analyses were conducted in SAS 9.4.

3. Results

3.1. What is the frequency of family/shared meals during COVID-19?

The mean number of family/shared meals during the COVID-19 pandemic was 4.6 ± 3.4 per week. Results indicated that 10.6% of participants reported no family/shared meals per week, 23.4% reported 1–2 family/shared meals per week, 23.1% reported 3–4 family/shared meals per week, 14.2% reported 5–6 family/shared meals per week, and 28.7% reported 7 or more family/shared meals per week (Table 2).

3.2. Who is having family/shared meals during COVID-19?

Results showed differences in family/shared meal frequency by ethnicity/race, $X^2(16, N = 585) = 33.68, p = .006$ (Table 3). Post-hoc tests indicated no significant differences by ethnicity/race in the lowest (no family/shared meals per week) or highest (7 or more family/shared meals per week) frequency categories. Significant differences by ethnicity/race were observed for the categories in between, such that a frequency of 1–2 family/shared meals per week was most commonly reported by Asian American participants (majority Hmong participants), a frequency of 3–4 family/shared meals per week was most commonly reported by participants of mixed or other ethnicity/race, and a frequency of 5–6 family/shared meals per week was most commonly reported by Hispanic/Latinx participants. No differences in family/shared meal frequency were observed by gender, socioeconomic status, temporary lay-off due to COVID-19, or past-year household food security.

Table 2

Family/shared meal frequency, home food availability, dietary consumption, and psychological well-being during the COVID-19 pandemic (N = 585).

Family Meals, % (n)	
Family/shared meal frequency	
0 meals/week	10.6 (62)
1–2 meals/week	23.4 (137)
3–4 meals/week	23.1 (135)
5–6 meals/week	14.2 (83)
7 + meals/week	28.7 (168)
Number of family/shared meals per week, <i>M</i> (<i>SD</i>)	
Home Food Availability, % usually or always (n)	4.6 (3.4)
Fruits and vegetables are available	81.9 (478)
Vegetables are part of dinner	69.9 (407)
Fresh fruit is accessible	71.6 (416)
Ready-to-eat vegetables are available	61.0 (353)
Whole wheat bread is available	56.9 (332)
Dietary Consumption, <i>M</i> (<i>SD</i>)	
Servings of fruit per day	1.4 (1.0)
Servings of vegetables per day	1.6 (1.2)
Sugar sweetened beverages per day	0.4 (0.5)
Times eating fast food per month	
Traditional burger-and-fries	3.6 (5.2)
Pizza	2.3 (3.3)
Other fast food	3.5 (5.2)
Psychological Well-Being, <i>M</i> (<i>SD</i>)	
Depressive symptoms (possible range: 10–30)	19.6 (5.7)
Perceived stress (possible range: 1–10)	5.6 (2.5)
Perceived ability to manage stress (possible range: 1–10)	6.3 (2.4)

Note. *M* = mean; *SD* = standard deviation.

3.3. Has the frequency family/shared meals increased during COVID-19?

Results adjusted for sociodemographic characteristics indicated that among participants who also lived with at least one family member at EAT 2018, the number of family/shared meals per week increased from 4.1 (standard error [*SE*] = 0.1) at EAT 2018 to 4.6 (*SE* = 0.2) during COVID-19, $F(1, 427) = 9.61, p = .002$, partial eta-squared = 0.02. Examination of mean family/shared meals per week during COVID-19 by each level of family/shared meal frequency at EAT 2018 suggested that family/shared meals increased more among participants who had reported fewer than 5 family/shared meals per week at EAT 2018 than among participants who had reported 5 or more family/shared meals (Table 4).

3.4. Associations between the frequency of family/shared meals during COVID-19 and home food availability, dietary consumption, and emotional well-being

After adjusting for sociodemographic characteristics, participants who reported at least 1–2 family/shared meals per week during the COVID-19 pandemic were more likely to usually have fruits and vegetables available and fresh fruit accessible in the home than those who reported no family/shared meals (Table 5). Participants who reported at least 3–4 family/shared meals per week during the COVID-19 pandemic were more likely to usually have fruits, vegetables, and whole wheat bread available and fresh fruit accessible in the home, eat more servings of fruits and vegetables per day, and report lower depressive symptoms and lower perceived stress than those who reported no family/shared meals. In addition, participants who reported 5–6 family/shared meals per week or more during the COVID-19 pandemic were more likely to usually have fruits and vegetables available, fresh fruit accessible, serve vegetables for dinner, have ready-to-eat vegetables, and whole wheat bread available in the home, as well as reported less depressive symptoms and lower perceived stress than those who reported no family/shared meals. Furthermore, participants reporting 7 or more family/shared meals per week were more likely to have fruits and vegetables available, fresh fruit accessible, serve vegetables for dinner, have whole wheat bread available in the home, as well as eat more servings of fruits

Table 3
Family/shared meal frequency by sociodemographic characteristics (N = 585).

	Number of Family/Shared Meals per Week		p	0 Meals/Week	1–2 Meals/Week	3–4 Meals/Week	5–6 Meals/Week	7 + Meals/Week	p
	N	M (SD)		% (n)					
Gender									
Male	208	4.3 (3.4)	0.31	15.4 (32)	21.2 (44)	23.6 (49)	13.9 (29)	26.0 (54)	0.18
Female	370	4.8 (3.4)		8.1 (30)	24.6 (91)	22.4 (83)	14.6 (54)	30.3 (112)	
Other	7	4.4 (3.1)		0.0 (0)	28.6 (2)	42.9 (3)	0.0 (0)	28.6 (2)	
Race/ethnicity									
White	154	5.0 (3.5)	0.11	13.0 (20) ^a	15.6 (24) ^a	22.7 (35) ^{a,b}	14.3 (22) ^{a,b,c}	34.4 (53) ^a	0.006
Black/African American	105	4.4 (3.4)		10.5 (11) ^a	25.7 (27) ^{b,c,d}	25.7 (27) ^{a,b}	11.4 (12) ^c	26.7 (28) ^a	
Hispanic/Latinx	105	4.9 (3.3)		8.6 (9) ^a	18.1 (19) ^{a,d}	22.9 (24) ^{a,b}	21.9 (23) ^b	28.6 (30) ^a	
Asian American	154	4.1 (3.4)		10.4 (16) ^a	36.4 (56) ^c	17.5 (27) ^b	10.4 (16) ^{a,c}	25.3 (39) ^a	
Mixed/other	67	4.8 (3.3)		9.0 (6) ^a	16.4 (11) ^{a,b,d}	32.8 (22) ^a	14.9 (10) ^{a,b,c}	26.9 (18) ^a	
Socioeconomic status									
Low/low-middle	316	4.5 (3.4)	0.07	10.4 (33)	26.0 (82)	22.5 (71)	13.6 (43)	27.3 (87)	0.22
Middle	105	4.3 (3.3)		13.3 (14)	21.0 (22)	25.7 (27)	17.1 (18)	22.9 (24)	
High-middle/high	153	5.2 (3.4)		7.2 (11)	20.3 (31)	20.9 (32)	14.4 (22)	37.3 (57)	
Temporarily laid off due to COVID-19									
No	503	4.6 (3.4)	0.76	10.1 (51)	23.1 (116)	23.5 (118)	15.1 (76)	28.2 (142)	0.47
Yes	82	4.5 (3.6)		13.4 (11)	25.6 (21)	20.7 (17)	8.5 (7)	31.7 (26)	
Past-year household food security									
Food secure	411	4.7 (3.4)	0.28	10.2 (42)	23.1 (95)	21.7 (89)	14.6 (60)	30.4 (125)	0.56
Food insecure	174	4.4 (3.4)		11.5 (20)	24.1 (42)	26.4 (46)	13.2 (23)	24.7 (43)	

Note. M = mean; SD = standard deviation. Within columns, each superscript letter indicates non-significant differences by sociodemographic characteristic at the 0.05 significance level.

Table 4
Longitudinal changes in family/shared meal frequency from EAT 2018 to C-EAT (N = 437).

	Number of Family/Shared Meals per Week at EAT 2018	Number of Family/Shared Meals per Week During COVID-19
	Estimated Marginal Mean (SE)	
Overall ^a	4.1 (0.1)	4.6 (0.2)
By family/shared meal frequency at EAT 2018	Observed M (SD)	Estimated Marginal Mean (SE)
0 meals/week	0.0 (0.0)	2.3 (0.5)
1–2 meals/week	1.5 (0.0)	3.3 (0.3)
3–4 meals/week	3.5 (0.0)	4.5 (0.3)
5–6 meals/week	5.5 (0.0)	5.6 (0.4)
7 + meals/week	9.0 (1.4)	6.7 (0.3)

Note. SE = standard error; M = mean; SD = standard deviation. These analyses were restricted to participants who also lived with at least one family member at EAT 2018 and in 2020. Analyses were adjusted for age, gender, ethnicity/race, and socioeconomic status.

^a Repeated measures ANCOVA indicated a statistically significant overall increase, $F(1, 427) = 9.61, p = .002$. Partial eta-squared = 0.02.

and vegetables per day, report less depressive symptoms and stress, and better perceived ability to manage stress than those who reported no family/shared meals. There were no significant associations between any family/shared meal frequency category and sugar sweetened beverages or eating fast food, though patterns suggested that each level of greater family/shared meal frequency—when considered in order from 1 to 2 meals, to 3–4 meals, to 5–6 meals, to 7 or more meals per week—was associated with progressively less frequent consumption of burger-and-fries fast food and pizza from a restaurant each month. Similar patterns suggestive of linear relationships were also observed for depressive symptoms and perceived ability to manage stress, such that each level of greater family/shared meal frequency was associated with progressively lower depressive symptoms and progressively greater perceived ability to manage stress. However, such clear linear patterns were not observed for any other variables examined.

4. Discussion

Results of this study provide an important first look at family/shared meal practices during the COVID-19 pandemic and associations with home food availability/accessibility, dietary consumption, and emotional well-being in young adults and their households. Findings indicated that young adults and their household members were engaging in almost five family/shared meals per week during the COVID-19 pandemic, which was a statistically significant increase from pre-COVID levels, though the effect size was small. These results confirm prior reports (Redmond, 2020) suggesting that family/shared meals have increased during the COVID-19 pandemic. However, study findings indicated that there may be disparities by race/ethnicity with regard to who is engaging in family/shared meals during the COVID-19 pandemic. For example, we found that Asian American young adults (majority were Hmong immigrant/refugees) were most likely to report only 1–2 family/shared meals per week. In addition, findings from the current study extend prior reports by showing that family/shared meal frequency during the COVID-19 pandemic was associated with more healthful home food availability and accessibility (i.e., fruits and vegetables), higher dietary consumption of some foods (i.e., fruits, vegetables), and emotional well-being (i.e., lower depressive symptoms and stress; higher perceived ability to manage stress). Furthermore, study findings extend previous studies by showing that, in a population of young adults in many stages of life (e.g., living with their parents, roommates, families of their own), engaging in regular family/shared meal routines was associated with beneficial dietary and emotional health outcomes during the COVID-19 pandemic.

Another important pattern to note in our study findings was that protective associations between family/shared meal frequency and home food availability healthy dietary consumption, and accessibility, and emotional well-being were present even at lower frequency levels of family/shared meals. For example, the associations with healthful fruit and vegetable availability and accessibility were statistically significant even at 1–2 family/shared meals per week and higher levels of fruit and vegetable consumption and emotional well-being were present at 3–4 or more family/shared meals per week. Thus, even incremental increases (e.g., from 1 to 2 meals/week to 3–4 meals/week) in family/shared meals may be associated with more healthful home availability/

Table 5
Associations between family/shared meal frequency and home food availability, dietary consumption, and psychological well-being during the COVID-19 pandemic.

Family/Shared Meal Frequency	Fruits and vegetables are available		Vegetables are part of dinner	Fresh fruit is accessible	Ready-to-eat vegetables are available	Whole wheat bread is available
	OR (95% CI)					
0 meals/week	1 (ref)		1 (ref)	1 (ref)	1 (ref)	1 (ref)
1–2 meals/week	3.04 (1.44, 6.39)**		1.27 (0.65, 2.47)	2.68 (1.37, 5.25)**	1.78 (0.94, 3.38)	1.75 (0.92, 3.35)
3–4 meals/week	2.50 (1.20, 5.22)*		1.62 (0.83, 3.17)	2.18 (1.13, 4.21)*	1.75 (0.92, 3.32)	2.01 (1.05, 3.85)*
5–6 meals/week	4.05 (1.63, 10.08)**		2.60 (1.21, 5.61)*	3.56 (1.66, 7.63)**	2.69 (1.32, 5.51)**	3.11 (1.52, 6.39)**
7 + meals/week	2.97 (1.44, 6.14)**		2.09 (1.08, 4.05)*	2.90 (1.52, 5.54)**	1.73 (0.93, 3.22)	2.30 (1.22, 4.33)*
Family/Shared Meal Frequency	Servings of fruit per day	Servings of vegetables per day	SSBs per day	Times eating traditional burger-and-fries fast food per month	Times eating pizza from restaurant per month	Times eating other fast food per month
	b (95% CI)					
0 meals/week	0 (ref)		0 (ref)	0 (ref)	0 (ref)	0 (ref)
1–2 meals/week	0.16 (-0.16, 0.47)	0.21 (-0.14, 0.57)	0.04 (-0.12, 0.20)	0.24 (-1.37, 1.85)	0.51 (-0.50, 1.52)	0.68 (-0.93, 2.29)
3–4 meals/week	0.39 (0.08, 0.71)*	0.56 (0.20, 0.91)**	0.07 (-0.09, 0.23)	0.07 (-1.55, 1.68)	0.39 (-0.62, 1.40)	0.71 (-0.90, 2.32)
5–6 meals/week	0.33 (-0.01, 0.67)	0.36 (-0.02, 0.75)	-0.06 (-0.23, 0.11)	-0.03 (-1.78, 1.72)	0.02 (-1.08, 1.11)	0.05 (-1.69, 1.79)
7 + meals/week	0.37 (0.06, 0.68)*	0.57 (0.22, 0.92)**	0.01 (-0.15, 0.16)	-0.96 (-2.53, 0.61)	0.01 (-0.97, 0.99)	-0.11 (-1.67, 1.46)
Family/Shared Meal Frequency	Depressive Symptoms		Perceived Stress		Perceived Ability to Manage Stress	
	b (95% CI)					
0 meals/week	0 (ref)		0 (ref)		0 (ref)	
1–2 meals/week	-1.09 (-2.84, 0.67)		-0.71 (-1.46, 0.05)		0.35 (-0.39, 1.09)	
3–4 meals/week	-1.98 (-3.74, -0.23)*		-1.08 (-1.84, -0.33)**		0.48 (-0.26, 1.22)	
5–6 meals/week	-2.59 (-4.49, -0.69)**		-1.03 (-1.85, -0.22)*		0.59 (-0.22, 1.39)	
7 + meals/week	-3.33 (-5.03, -1.62)**		-1.03 (-1.76, -0.29)**		0.72 (0.002, 1.44)*	

Note. OR = odds ratio; CI = confidence interval. Models were adjusted for age, gender, ethnicity/race, and socioeconomic status. Example interpretations: after adjusting for sociodemographic characteristics, participants who reported 3–4 family meals per week during COVID-19 had 2.5 times greater odds of usually having fruits and vegetables available in the home and experienced, on average, lower depressive symptom scores by nearly 2 points compared to those who reported no family meals. * $p < .05$, ** $p < .01$, *** $p < .001$.

accessibility, dietary consumption, and emotional well-being for young adults and their households. These results are consistent with findings pre-pandemic regarding the association between having consistent family meals over time, even at a low frequency, being protective for young adult health and well-being (Berge et al., 2015).

Study findings also emphasize the importance of family/shared meal routines and emotional well-being. For almost every family/shared meal frequency category, associations were strong and consistent with young adults reporting lower levels of depressive symptoms and perceived stress. These findings support prior studies showing that engaging in family/shared meal routines promotes emotional well-being because of the nature of the family/shared meal which provides opportunities for communicating and sharing thoughts and feelings, a sense of safety and predictability, and connecting interpersonally with others (Neumark-Sztainer et al., 2010; Berge et al., 2018; Utter et al., 2018; Fulkerson et al., 2006; Eisenberg et al., 2004; Fulkerson et al., 2007). This may be the same pattern occurring during COVID-19 where families and households who are engaging in family/shared meals routines are creating safe interpersonal environments that promote emotional well-being in their family and household members.

Findings from the current study are also useful when interpreted alongside other prior family/shared meals studies. For example, previous studies have shown that benefits of family/shared meals, including healthy dietary intake and emotional well-being, are present regardless of whether the family/shared meal occurred at breakfast, lunch or dinner (Larson et al., 2013; Larson et al., 2016; Berge et al., 2017). Thus, the flexibility of engaging in a family/shared meal during any meal occurring within the day may feel like a highly doable routine that young adults and their families or household members may be able to engage in during the COVID-19 pandemic. The flexibility of engaging in even 1–2 family/shared meals per week and for any meal occasion (i.e., breakfast, lunch, or dinner) may be particularly important for families and households during the COVID-19 pandemic who may be feeling high levels of stress due to working at home, being laid off, having children in distance or hybrid learning models for schooling, or other

unexpected challenges resulting from COVID-19.

There are important implications of our study findings for public health professionals, policy makers, and health care providers. First, it may be important for public health campaigns to focus on messages regarding the importance of carrying out family/shared meal routines during public health crises, such as COVID-19 and potential future public health crises, when routines and schedules have been disrupted. In particular, it would be important for these messages to be targeted to diverse families and in their own languages in order for all young adults and their households to benefit from the protective nature of family/shared meals. In addition, it may be useful for policy makers to partner with community organizations, such as food pantries, to create and pass legislation that would provide resources (e.g., SNAP, vouchers, family/shared meal kits) for young adults and their households to engage in family/shared meals during public health crises. There are also potential implications for health care providers, such as engaging in anticipatory guidance with young adults in all stages of life (e.g., living with their parents, roommates, families of their own), to encourage them to engage in family/shared meal routines as one way of finding dietary health and emotional well-being during public health crises, such as COVID-19 pandemic, and into the resolution of the pandemic.

There were both strengths and weaknesses of the current investigation. One strength of the current study includes the rapid response nature of the study, allowing for examining important associations during a public health crisis. Second, the sociodemographic diversity of the young adult participants is a strength. The current study provided valuable insights into the experiences of ethnically/racially diverse young people and was inclusive of persons living with roommates, persons living with their parents, and others who were living with families of their own. Third, the ability to conduct longitudinal analyses examining the change in family/shared meal frequency pre-COVID to during COVID is a strength of the study and not done in other research. There are also study weaknesses to be taken into account in interpreting the findings. First, this study has limited generalizability, given our sample was a convenience sample of young adults in one Midwestern

state. In addition, the brevity of survey measures was a limitation, as well as the inability to use validated measures of dietary intake due to prioritizing the need to keep the survey short to reduce burden on participants during the pandemic. Furthermore, the overall stress levels of the C-EAT sample were moderate, which may mean participants with higher stress levels elected not to take the survey. Another limitation is the cross-sectional design of the study. While some of our research questions were able to be analyzed using our longitudinal dataset, the research questions related to associations between family/shared meal frequency and home food availability/accessibility, dietary consumption, and emotional well-being were cross-sectional, which limits our understanding of temporality of associations. It will be important for future research to follow participants longitudinally to examine whether the increase in family meals connected with COVID-19 continue into the future and whether there are differences by sociodemographic characteristics.

5. Conclusions

Overall, study findings indicated that engaging in family/shared meal routines may provide protective associations with dietary and emotional well-being during the COVID-19 pandemic and potentially future public health crises. Findings provide implications for public health, policy, and health care domains such as (1) executing public health communication campaigns around family/shared meals; (2) informing policy changes to provide resources to ensure family meals can be carried out in diverse families during public health crisis; and (3) recommendations for healthcare providers to engage in anticipatory guidance with young adults regarding the importance of family/shared meals. Future longitudinal research is needed to examine whether the significant associations found in the current study result in long-term benefits post-COVID-19.

6. Contributors statement

Jerica M. Berge: Dr. Berge conceptualized the paper, assisted with data analysis and interpretation, wrote all drafts of the paper, gave final approval of this version to be published, and agrees to be accountable for all aspects of the work regarding the accuracy or integrity of any part of the work.

Vivienne Hazzard: Dr. Hazzard conducted the data analysis. She also critically reviewed the paper, gave final approval of this version to be published, and agrees to be accountable for all aspects of the work regarding the accuracy or integrity of any part of the work.

Nicole Larson: Dr. Larson coordinated data collection, organized the data, and assisted with interpretation of the data. She also critically reviewed the paper, gave final approval of this version to be published, and agrees to be accountable for all aspects of the work regarding the accuracy or integrity of any part of the work.

Samantha Hahn: Dr. Hahn assisted with the conceptualization of the paper and the interpretation of the results. She also critically reviewed the paper, gave final approval of this version to be published, and agrees to be accountable for all aspects of the work regarding the accuracy or integrity of any part of the work.

Rebecca Emery: Dr. Emery assisted with data acquisition, critically reviewed the paper, gave final approval of this version to be published, and agrees to be accountable for all aspects of the work regarding the accuracy or integrity of any part of the work.

Dianne Neumark-Sztainer: Dr. Neumark-Sztainer is the principal investigator of the study, assisted in conceptualizing the paper and contributed to the design of the study. She also critically reviewed the paper, gave final approval of this version to be published, and agrees to be accountable for all aspects of the work regarding the accuracy or integrity of any part of the work.

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8. Financial disclosure

Authors have no financial disclosures to report.

9. Table of Contents Summary

This study examined associations between family/shared meals and home food availability, dietary consumption, and emotional well-being among young adults and their households during COVID-19.

10. What's Known on this Subject

Engaging in regular family/shared meals is associated with healthy dietary consumption and emotional well-being however, it is unknown whether this association holds true during a public health crisis.

11. What This Study Adds

Family/shared meals increased from pre-COVID to during COVID and was associated with healthy dietary consumption, healthy food availability/accessibility, and emotional well-being in young adults.

CRediT authorship contribution statement

Jerica M. Berge; Vivienne M. Hazzard; Nicole Larson; Samantha L. Hahn; Rebecca L. Emery; Dianne Neumark-Sztainer.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- Arcan, C., Larson, N., Bauer, K., Berge, J., Story, M., Neumark-Sztainer, D., 2014. Dietary and weight-related behaviors and body mass index among Hispanic, Hmong, Somali, and White adolescents. *J. Acad. Nutr. Diet.* 114 (3), 375–383.
- Berge, J., MacLehose R. All in The Family: Family Members Weight and Weight-Related Behaviors and Adolescent Obesity. In: National Institutes of Health; 2013.
- Berge, J.M., MacLehose, R.F., Loth, K.A., Eisenberg, M.E., Fulkerson, J.A., Neumark-Sztainer, D., 2012. Family meals. Associations with weight and eating behaviors among mothers and fathers. *Appetite* 58 (3), 1128–1135.
- Berge, J.M., Jin, S.W., Hannan, P., Neumark-Sztainer, D., 2013. Structural and interpersonal characteristics of family meals: associations with adolescent body mass index and dietary patterns. *J. Acad. Nutr. Diet.* 113 (6), 816–822.
- Berge, J.M., Rowley, S., Trofholz, A., Hanson, C., Rueter, M., MacLehose, R.F., Neumark-Sztainer, D., 2014. Childhood obesity and interpersonal dynamics during family meals. *Pediatrics* 134 (5), 923–932.

- Berge, J.M., Wall, M., Hsueh, T.-F., Fulkerson, J.A., Larson, N., Neumark-Sztainer, D., 2015. The protective role of family meals for youth obesity: 10-year longitudinal associations. *J. Pediatr.* 166 (2), 296–301.
- Berge, J.M., Meyer, C., MacLehose, R.F., Crichlow, R., Neumark-Sztainer, D., 2015. All in the family: correlations between parents' and adolescent siblings' weight and weight-related behaviors. *Obesity* (Silver Spring, Md.) 23 (4), 833–839.
- Berge, J.M., Truesdale, K.P., Sherwood, N.E., Mitchell, N., Heerman, W.J., Barkin, S., Matheson, D., Levers-Landis, C.E., French, S.A., 2017. Beyond the dinner table: who's having breakfast, lunch and dinner family meals and which meals are associated with better diet quality and BMI in pre-school children? *Public Health Nutr.* 20 (18), 3275–3284.
- Berge, J.M., Miller, J., Watts, A., Larson, N., Loth, K.A., Neumark-Sztainer, D., 2018. Intergenerational transmission of family meal patterns from adolescence to parenthood: longitudinal associations with parents' dietary intake, weight-related behaviours and psychosocial well-being. *Public Health Nutr.* 21 (2), 299–308.
- Blumberg, S.J., Bialostosky, K., Hamilton, W.L., Briefel, R.R., 1999. The effectiveness of a short form of the Household Food Security Scale. *Am. J. Public Health* 89 (8), 1231–1234.
- Christian, M.S., Evans, C.E.L., Hancock, N., Nykjaer, C., Cade, J.E., 2013. Family meals can help children reach their 5 A Day: a cross-sectional survey of children's dietary intake from London primary schools. *J. Epidemiol. Community Health* 67 (4), 332–338.
- Dallacker, M., Hertwig, R., Mata, J., 2018. The frequency of family meals and nutritional health in children: a meta-analysis. *Obes. Rev.* 19 (5), 638–653.
- Dallacker, M., Hertwig, R., Mata, J., 2019. Quality matters: A meta-analysis on components of healthy family meals. *Health Psychol.* 38 (12), 1137–1149.
- do Amaral EMGR, Silva PO, Nakabayashi J, Bandeira MV, Toral N, Monteiro R. Family meal frequency and its association with food consumption and nutritional status in adolescents: A systematic review. *PLoS one.* 2020;15(9):e0239274.
- Eisenberg, M.E., Olson, R.E., Neumark-Sztainer, D., Story, M., Bearinger, L.H., 2004. Correlations between family meals and psychosocial well-being among adolescents. *Arch. Pediatr. Adolesc. Med.* 158 (8), 792–796.
- Errisuriz, V.L., Pasch, K.E., Perry, C.L., 2016. Perceived stress and dietary choices: The moderating role of stress management. *Eat. Behav.* 22, 211–216.
- Feskanich, D., Rimm, E.B., Giovannucci, E.L., Colditz, G.A., Stampfer, M.J., Litin, L.B., Willett, W.C., 1993. Reproducibility and validity of food intake measurements from a semiquantitative food frequency questionnaire. *J. Am. Diet. Assoc.* 93 (7), 790–796.
- Fruh, S.M., Fulkerson, J.A., Mulekar, M.S., Kendrick, L.A.J., Clanton, C., 2011. The Surprising Benefits of the Family Meal. *J. Nurse Practit.* 7 (1), 18–22.
- Fulkerson, J.A., Story, M., Mellin, A., Leffert, N., Neumark-Sztainer, D., French, S.A., 2006. Family dinner meal frequency and adolescent development: Relationships with developmental assets and high-risk behaviors. *J. Adolesc. Health* 39 (3), 337–345.
- Fulkerson, J.A., Strauss, J., Neumark-Sztainer, D., Story, M., Boutelle, K., 2007. Correlates of psychosocial well-being among overweight adolescents: the role of the family. *J. Consult. Clin. Psychol.* 75 (1), 181–186.
- Fulkerson, J.A., Neumark-Sztainer, D., Hannan, P.J., Story, M., 2008. Family meal frequency and weight status among adolescents: cross-sectional and 5-year longitudinal associations. *Obesity* (Silver Spring, Md.) 16 (11), 2529–2534.
- Fulkerson, J.A., Neumark-Sztainer, D., Hannan, P.J., Story, M., 2008. Family meal frequency and weight status among adolescents: Cross-sectional and five-year longitudinal associations. *Obesity* 16, 2529–2534.
- Fulkerson, J.A., Kubik, M.Y., Story, M., Lytle, L., Arcan, C., 2009. Are there nutritional and other benefits associated with family meals among at-risk youth? *J. Adolesc. Health* 45 (4), 389–395.
- Fulkerson, J.A., Pasch, K.E., Stigler, M.H., Farbaksh, K., Perry, C.L., Komro, K.A., 2010. Longitudinal Associations Between Family Dinner and Adolescent Perceptions of Parent-Child Communication Among Racially Diverse Urban Youth. *J. Fam. Psychol.* 24 (3), 261–270.
- Fulkerson, J.A., Larson, N., Horning, M., Neumark-Sztainer, D., 2014. A review of associations between family or shared meal frequency and dietary and weight status outcomes across the lifespan. *J. Nutr. Educ. Behav.* 46 (1), 2–19.
- Fulkerson, J.A., Friend, S., Horning, M., Flattum, C., Draxten, M., Neumark-Sztainer, D., Gurvich, O., Garwick, A., Story, M., Kubik, M.Y., 2018. Family Home Food Environment and Nutrition-Related Parent and Child Personal and Behavioral Outcomes of the Healthy Home Offerings via the Mealtime Environment (HOME) Plus Program: A Randomized Controlled Trial. *J. Acad. Nutr. Diet.* 118 (2), 240–251.
- Goldfield, G.S., Murray, M.A., Buchholz, A., Henderson, K., Obeid, N., Kukawadia, A., Flament, M.F., 2011. Family meals and body mass index among adolescents: effects of gender. *Applied physiology, nutrition, and metabolism = Physiologie appliquee, nutrition et metabolisme* 36 (4), 539–546.
- Hardeman, R.R., Medina, E.M., Kozhimannil, K.B., 2016. Structural Racism and Supporting Black Lives - The Role of Health Professionals. *New Engl. J. Med.* 375 (22), 2113–2115.
- Hardeman, R.R., Medina, E.M., Kozhimannil, K.B., 2017. Race vs Burden in Understanding Health Equity. *JAMA* 317 (20), 2133. <https://doi.org/10.1001/jama.2017.4616>.
- Hardeman, R.R., Murphy, K.A., Karbeah, J., Kozhimannil, K.B., 2018. Naming Institutionalized Racism in the Public Health Literature: A Systematic Literature Review. *Public Health Rep.* (Washington, DC) 133 (3), 240–249.
- Horning, M.L., Fulkerson, J.A., Friend, S.E., Neumark-Sztainer, D., 2016. Associations among Nine Family Dinner Frequency Measures and Child Weight, Dietary, and Psychosocial Outcomes. *J. Acad. Nutr. Diet.* 116 (6), 991–999.
- Kandel, D.B., Davies, M., 1982. Epidemiology of depressive mood in adolescents: An empirical study. *Arch. Gen. Psychiatry* 39 (10), 1205–1212.
- Larson N, Story M. Family meal patterns and eating in children and adolescents. In: L. D, A. B, A. D, et al., eds. *Obesity Prevention: The Role of Brain and Society on Individual Behavior*. London, UK: Elsevier; 2010.
- Larson N, Laska M, Neumark-Sztainer D. Food insecurity, diet quality, home food availability, and health risk behaviors among emerging adults: findings from the EAT 2010-2018 study. *Am. J. Public Health*. In press.
- Larson, N., MacLehose, R., Fulkerson, J.A., Berge, J.M., Story, M., Neumark-Sztainer, D., 2013. Eating breakfast and dinner together as a family: associations with sociodemographic characteristics and implications for diet quality and weight status. *J. Acad. Nutr. Diet.* 113 (12), 1601–1609.
- Larson, N., Fulkerson, J., Story, M., Neumark-Sztainer, D., 2013. Shared meals among young adults are associated with better diet quality and predicted by family meal patterns during adolescence. *Public Health Nutr.* 16 (5), 883–893.
- Larson, N., Laska, M.N., Neumark-Sztainer, D., 2020. Food Insecurity, Diet Quality, Home Food Availability, and Health Risk Behaviors Among Emerging Adults: Findings From the EAT 2010–2018 Study. *Am. J. Public Health* 110 (9), 1422–1428.
- Larson, N.I., Neumark-Sztainer, D., Hannan, P.J., Story, M., 2007. Family meals during adolescence are associated with higher food quality and healthful meal patterns during young adulthood. *J. Am. Diet. Assoc.* 107, 1502–1510.
- Larson, N.I., Nelson, M.C., Neumark-Sztainer, D., Story, M., Hannan, P.J., 2009. Making time for meals: Meal structure and associations with dietary intake in young adults. *J. Am. Diet. Assoc.* 109 (1), 72–79.
- Larson, N.I., Nelson, M.C., Neumark-Sztainer, D., Story, M., Hannan, P., 2009. Making time for meals: Meal structure and association with dietary intake in young adults. *J. Am. Diet. Assoc.* 109, 72–79.
- Larson, N., Slaughter-Acey, J., Alexander, T., Berge, J., Harnack, L., Neumark-Sztainer, D., 2021. Emerging adults' intersecting experiences of food insecurity, unsafe neighbourhoods and discrimination during the coronavirus disease 2019 (COVID-19) outbreak. *Public Health Nutr.* 24 (3), 519–530.
- Larson, N.I., Wall, M.M., Story, M.T., Neumark-Sztainer, D.R., 2013. Home/family, peer, school, and neighborhood correlates of obesity in adolescents. *Obesity* 21 (9), 1858–1869.
- Larson, N., Wang, Q.i., Berge, J.M., Shanafelt, A., Nannery, M.S., 2016. Eating breakfast together as a family: mealtime experiences and associations with dietary intake among adolescents in rural Minnesota, USA. *Public Health Nutr.* 19 (9), 1565–1574.
- Lechner, W.V., Laurene, K.R., Patel, S., Anderson, M., Grega, C., Kenne, D.R., 2020. Changes in alcohol use as a function of psychological distress and social support following COVID-19 related University closings. *Addict. Behav.* 110, 106527. <https://doi.org/10.1016/j.addbeh.2020.106527>.
- Leeb, R.T., Bitsko, R.H., Radhakrishnan, L., Martinez, P., Njai, R., Holland, K.M., 2020. Mental Health-Related Emergency Department Visits Among Children Aged <18 Years During the COVID-19 Pandemic - United States, January 1-October 17, 2020. *MMWR Morb. Mortal Wkly. Rep.* 69 (45), 1675–1680.
- Loth, K.A., MacLehose, R.F., Larson, N., Berge, J.M., Neumark-Sztainer, D., 2016. Food availability, modeling and restriction: How are these different aspects of the family eating environment related to adolescent dietary intake? *Appetite* 96, 80–86.
- Mason, S.M., Santaularia, N.J., Berge, J.M., Larson, N., Neumark-Sztainer, D., 2018. Is the childhood home food environment a confounder of the association between child maltreatment exposure and adult body mass index? *Prev. Med.* 110, 86–92.
- Nelson, M.C., Lust, K., Story, M., Ehlinger, E.d., 2008. Credit card debt, stress and key health risk behaviors among college students. *Am. J. Health Promotion: AJHP* 22 (6), 400–406.
- Neumark-Sztainer, D., 2005. What can we do to help parents raise children with a healthy weight and a healthy body image? *Eating Disord.* 13 (5), 491–495.
- Neumark-Sztainer, D., Wall, M., Story, M., Fulkerson, J.A., 2004. Are family meal patterns associated with disordered eating behaviors among adolescents? *J. Adolesc. Health* 35, 350–359.
- Neumark-Sztainer, D., Eisenberg, M.E., Fulkerson, J.A., Story, M., Larson, N.I., 2008. Family meals and disordered eating in adolescents: longitudinal findings from Project EAT. *Arch. Pediatr. Adolesc. Med.* 162 (1), 17–22.
- Neumark-Sztainer, D., Larson, N.I., Fulkerson, J.A., Eisenberg, M.E., Story, M., 2010. Family meals and adolescents: what have we learned from Project EAT (Eating Among Teens)? *Public Health Nutr.* 13 (7), 1113–1121.
- Prime, H., Wade, M., Browne, D.T., 2020. Risk and resilience in family well-being during the COVID-19 pandemic. *Am. Psychol.* 75 (5), 631–643.
- Redmond R. Family meals take on renewed value amid pandemic. *Supermarket News*. <https://www.supermarketnews.com/consumer-trends/family-meals-take-renewed-value-amid-pandemic>. Published 2020. Accessed September 27, 2020.
- Robson, S.M., McCullough, M.B., Rex, S., Munafò, M.R., Taylor, G., 2020. Family Meal Frequency, Diet, and Family Functioning: A Systematic Review With Meta-analyses. *J. Nutr. Educ. Behav.* 52 (5), 553–564.
- Story, M., Kaphingst, K.M., Robinson-O'Brien, R., Glanz, K., 2008. Creating healthy food and eating environments: Policy and environmental approaches. *Annu. Rev. Public Health* 29 (1), 253–272.
- Utter, J., Scragg, R., Schaaf, D., Mhurchu, C.N., 2008. Relationships between frequency of family meals, BMI and nutritional aspects of the home food environment among New Zealand adolescents. *Int. J. Behav. Nutr. Phys. Activity* 5 (1), 50. <https://doi.org/10.1186/1479-5868-5-50>.
- Utter, J., Denny, S., Robinson, E., Fleming, T., Ameratunga, S., Grant, S., 2013. Family Meals among New Zealand Young People: Relationships with Eating Behaviors and Body Mass Index. *J. Nutr. Educ. Behav.* 45 (1), 3–11.

Utter, J., Denny, S., Robinson, E., Fleming, T., Ameratunga, S., Grant, S., 2013. Family meals and the well-being of adolescents. *J. Paediatr. Child Health* 49 (11), 906–911.

Utter, J., Larson, N., Berge, J.M., Eisenberg, M.E., Fulkerson, J.A., Neumark-Sztainer, D., 2018. Family meals among parents: Associations with nutritional, social and emotional wellbeing. *Prev. Med.* 113, 7–12.

Yuan C, Spiegelman D, Rimm E, et al. Validity of a dietary questionnaire assessed by comparison with multiple weighed dietary records or 24-hour recalls. *Am. J. Epidemiol.* 2017;185(7):570–584.