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Association between meal frequency with others and psychological distress during the COVID-19 pandemic: A cross-sectional study

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Abstract

Aim: Previous studies evaluated the association between eating alone and mental health mainly in older people and adolescents. This study aimed to evaluate the association between dinner frequency with others and psychological distress during the COVID-19 outbreak among the Japanese working population.

Methods: Data were acquired from a prospective online cohort study (the Employee Cohort Study in the COVID-19 pandemic in Japan) conducted in February 2021 as a cross-sectional design. Dinner frequency with others was categorized into five groups: "almost daily," "4–5 times per week," "2–3 times per week," "once per week," and "less than once per week," setting them as a predictor variable. Modified Poisson regression was performed to calculate the prevalence ratio of psychological distress with multiple imputation for missing data. Global fear and worry about COVID-19 were adjusted as a covariate.

Results: A total of 1171 participants completed the questionnaire. Respondents who ate dinner with others "almost daily" had the least psychological distress than those who ate with others "4–5 times," "2–3 times," and "once per week" in the crude model (prevalence ratio (95% CI): 1 [reference], 1.34 [1.08–1.67], 1.40 [1.15–1.69], 1.44 [1.12–1.85], respectively). The association was comparable after adjusting for global fear and worry about COVID-19.

Conclusions: Among those who ate dinner with others at least once a week, those who ate with others "almost daily" had the least psychological distress. The association was comparable after adjusting for global fear and worry about COVID-19. Further study is needed on why those who eat with others less than once a week may have a lower prevalence ratio of having mental distress.

KEYWORDS
COVID-19 pandemic, eating alone, meal frequency with others, psychological distress

INTRODUCTION

Eating with others is a fundamental social aspect of human behavior that affects both physical and mental health.[1] Previous studies stated that eating alone was related with having an unbalanced diet,[2] irregular eating patterns,[3] and low subjective health.[4–8] Among workers, eating together with coworkers increases the sense of cooperation and work group performance,[9] and conversations with co-workers during meals facilitate healthier habits.[10] In recent times, a wide variety of working styles,[11] family structure changes,[12] and the outbreak of COVID-19[13] have influenced with whom and how people eat. Therefore, eating alone is an essential public health issue under the COVID-19 pandemic.

Many studies have shown that eating alone is significantly associated with mental health. Existing evidence suggests that eating alone is associated with depressive symptoms,[14–17] and those who eat alone yet live with others have the highest risk of depression.[15] Among adolescents, family meal frequency is associated with positive psychological outcomes.[5]

However, to date, research gaps remain regarding associations between eating alone and mental health. First, previous studies mainly focused on adolescents, older people, or specific populations, such as residents in assisted living facilities[18] and solo diners at restaurants.[19] At present, two studies have investigated how eating alone affects adults. One study in Korea showed that the incidences of suicide and depression were associated with eating alone.[20] The other study, with Japanese workers, reported the risk of depression increased dose-responsively when the frequency of eating meals with others decreased.[21] Although the mechanisms of why eating alone influences mental status are poorly understood, several reasons are discussed among older people. For older people, sharing meals provides opportunities for social integration, social support, and companionship to occur.[22] The lack of it deprives people of an essential socialization opportunity to interact with others, which poses a substantial risk to mental health. However, working people would have more opportunities for social engagement than older people. Thus, it is unknown whether eating alone may be a risk factor for psychological distress among the working population.

Second, little information has been available since the outbreak of COVID-19 began. The COVID-19 pandemic has been reported to increase the levels of anxiety, depression, post-traumatic stress disorder, and psychological distress,[23,24] and the global prevalence of psychological distress among the general population is estimated to be up to 30%–50%.[24,25] While physical distancing of 1 m or more supports the reduced risk of transmission of viruses,[26] social preventive measures, such as social distancing and stay-at-home measures, limit opportunities for people to eat together in everyday settings. As for working conditions, the COVID-19 pandemic led people to work remotely to reduce contact with people or to eat alone with partitions in offices. At home, household members living together may be concerned about the risk of transmission in eating together. However, those who live alone may feel relieved to have no contact with others because they can be protected from the risk of infection. Hence, the association between eating alone and mental health may be reduced by the global fear and worry about COVID-19.

Third, most previous studies defined eating with others as "eating with others at least once a day" or "usually eating with others," with less focus directed to each meal. However, as each meal has different associations with our eating behavior and health status,[27–29] associations between eating alone and mental health may also be considered separately. For the working population, breakfast is difficult to evaluate, because many young adults skip breakfast more frequently than lunch or dinner.[30] During lunch, the meal setting and companion largely depend on working style. Among shift workers, irregular working hours influence the schedule of meals on eating behaviors,[11] and meals often take place when food and time to eat are available, rather than in a social context of eating together.[31] The family meal is the most common commensal meal and dinners late at night are often preferred for commensal eating among the working population.[32] Therefore, dinner frequency with others would be the most appropriate to evaluate as a predictor variable for practical interventions to improve the mental health of workers.

To overcome these deficits, the current study examines the association between meal frequency with others and psychological distress in a general population of Japanese workers under the COVID-19 pandemic. We hypothesized that those who ate dinner with others less frequently would have a higher risk of having psychological distress, and that global fear and worry about COVID-19 would attenuate the association. We also analyzed the data stratifying by living status, as living arrangements had the strongest impact on commensality pattern and affected meal frequency with others.[33,34] While workers who live alone need to seek dinner meal companions, those who live together have greater opportunities to eat together, thus commensal meals greatly depend on living arrangements. As also confirmed by studies in the older population,[15] the association between meal frequency with others and psychological distress may vary by living status.

METHODS

Sample

This study is a cross-sectional design, using the longitudinal survey of the Employee Cohort Study in the COVID-19 pandemic in Japan (E-COCO-J), which was administered among a cohort of full-time employees in Japan. Employees aged 20–59 years living in Japan were eligible to participate in the study. An e-mail was sent to participants recruited from an online survey company prior to the registration of the information. The questionnaire was closed when it reached the target number. A total of 4120 employees participated in February 2019. These participants were asked to answer online questions, on March 19–22, 2020, for baseline characteristics. The targeted number for the sample was set at 1200; the total number of eligible participants of the current study was 1171 (T5 survey),

conducted on February 4–10, 2021. After excluding those who usually skipped dinner, 1109 participants were included in the final analysis. The participant recruitment flowchart is shown in Figure 1. This article conforms to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[35] The anonymity of participants was ensured, and they signed informed consent online. The current study was approved by the Research Ethics Committee of The University of Tokyo (No.10856-(2) (3)(4)(5)(6)).

Measures

Eating behavior

Meal frequency with others was requested with the question: "During the past 1 month, how often did you have dinner with others?" Response options were "almost daily," "4–5 times per week," "2–3 times per week," "once per week," "less than once per week," or "usually skip dinner." Meal frequency with others meant having any dinner companion, including family members, friends, or someone in the community or workplace. We also asked the same question for the situation before March 2020, when the number of COVID-19 patients was relatively low prior to the first state of emergency announcement in April 2020. Reasons for eating alone and merits of eating together were also asked by multiple choice questions. The personal value of eating alone was asked by the question "How do you feel when you are eating alone?" The response options were "I feel concerned about it," "I do not mind it" and "I have no idea." Since validated questions from previous studies were unavailable regarding reasons, merits, and the personal value of eating alone, we used questions and answers from the white paper of Shokuiku ("Dietary Education" in English) in Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF, Japan)[36] and revised them based on comments from professionals of nutrition epidemiology in the University of Tokyo (S. S.).

Psychological distress

Psychological distress was measured using K6, a six-item nonspecific psychological distress screening instrument. The response choices ranged from "none of the time" (=0) to "all of the time" (=4). All six items are summed up at the maximum score of 24. We considered a

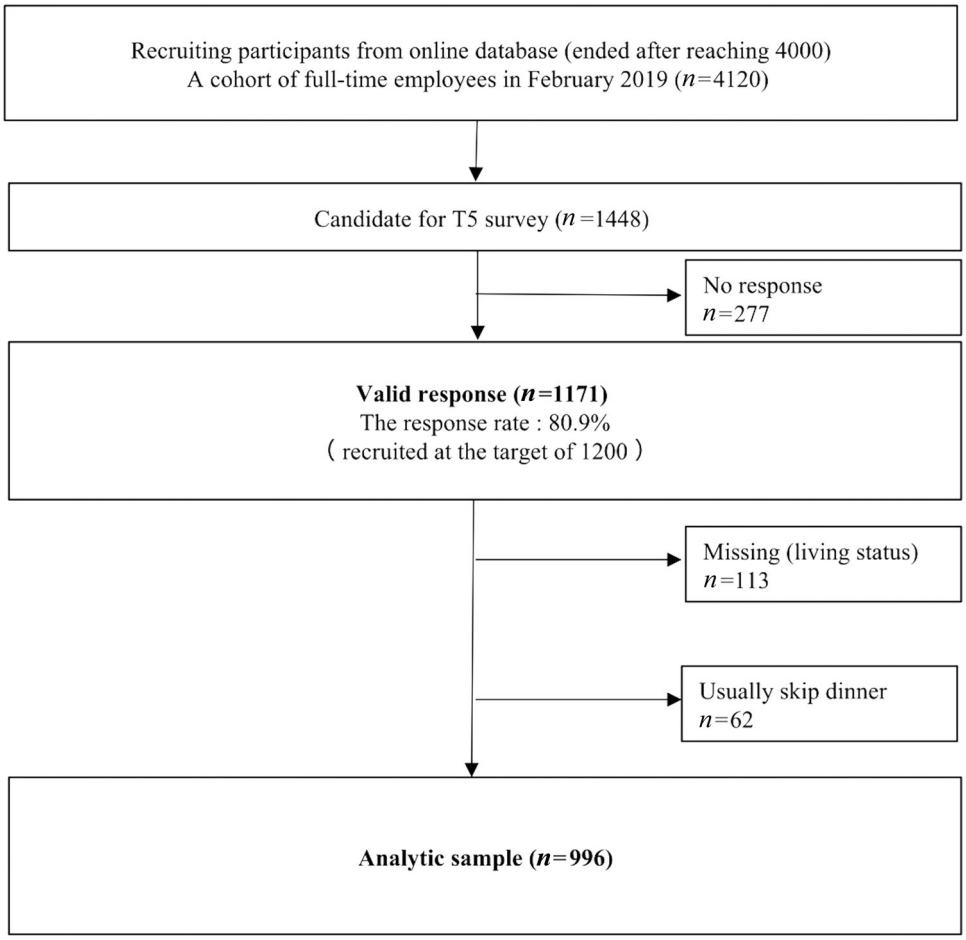

FIGURE 1 Flowchart of participant recruitment

score of 5 as the cut-off for moderate psychological distress based on the clinical validation studies of the K6.[37] The Japanese version of the K6 showed acceptable reliability and validity.[38]

Confounder: Global fear and worry about COVID-19

Global fear and worry about COVID-19 were assessed using the single item[39]: "Do you feel anxiety about COVID-19?" Responses were rated on a six-point Likert-scale ranging from "No, not at all" (=1) to "Yes, feel strongly" (=6). This one item was not evaluated for reliability and validity.

Other potential confounders

Demographic characteristics were measured at the baseline survey. Potential confounders were: gender (men or women), age (20–29, 30–39, 40–49, ≥50 years), educational attainment (high school or less, undergraduate, postgraduate or higher), living status (living alone or living together), excessive working hours (<40 h per week, >40 h per week), income (<5 million yen, 5 million to 7.5 million yen, 7.5–10 million yen, >10 million yen per year), alcohol drinking (current-drinker or nondrinker), smoking habit (current-smoker or nonsmoker), body mass index (<22 or >22, calculated as weight in kilograms divided by the square of height in meters [kg/m^2]), and residential area (state of emergency area in February 2021, including Tochigi, Saitama, Tokyo, Kanagawa, Aichi, Gifu, Hyogo, Osaka, Kyoto, Fukuoka Prefecture; or other area).

Statistical analysis

Statistical analyses were conducted using R version 4.0.3. The data were extracted from the T5 survey as a cross-sectional design. Since prevalence of participants who had moderate psychological distress was high (>10%), we used modified Poisson regression[40] to calculate the prevalence ratio of having moderate psychological distress by setting dinner frequency with others as a predictor variable. Ordinal numbers 1–5 were assigned according to five groups of "almost daily," "4–5 times per week," "2–3 times per week," "once per week," and "less than once per week." Participants who usually skipped dinner after the COVID-19 outbreak were excluded from the analysis. We fitted three models. Model 1 evaluated crude association without adjusting for covariates. Model 2 adjusted for global fear and worry about COVID-19, age, gender, and working hours to adjust for the differences in the COVID-19 pandemic. Model 3 adjusted other variables, including educational attainment, living status, alcohol, smoking, BMI, and residential area. Model 4 additionally adjusted for income. We performed multiple imputation (100 imputed datasets) based on Rubin's rule to address missing values.[41] Missing data were found in variables including income (N = 226, 23%) and working time (N = 33, 3.3%). We also analyzed the model stratified by living status. The results are presented by calculating prevalence ratio (PR) and 95% confidence intervals (95% CIs) of psychological distress for the frequency of eating with others, using those who ate dinner with others almost daily as reference group. A significance level of 0.05 was considered statistically significant. For sensitivity analysis, we employed the same statistical method, including those who usually skipped dinner as a predictor variable.

RESULTS

Figure 1 shows the flow of the participants' recruitment. A total of 1171 participants were included as the valid response (response rate: 80.9%). After excluding those who usually skipped dinner and those with missing data of living status, 996 were included for the final analytic sample. Table 1 shows the demographic characteristics of the sample. Participants mainly lived with others, worked more than 40 h per week, and more than half of the participants lived in an area where the state of emergency was declared by the Japanese Government when the questionnaire was conducted. They had a higher education compared with the Japanese working population conducted in a national consensus in Japan (Supporting Information: Appendix 1). Table 2 shows the results of eating behaviors. After the COVID-19 outbreak, 7.8% were eating with others less than once a day, while 75.9% were eating with others daily. This tendency was similar before the first state of emergency in Japan (April 2020), regardless of living status. For those who lived alone, the reason for eating alone was mainly due to the lack of dinner companion(s), followed by difference of time and places to eat. By contrast, those who lived with others answered that they mostly ate alone when their schedule was different from that of their housemates, followed by having no idea about eating alone. A similar reason, "having no reason," was also seen in free answers. Most participants answered that having a joyful time or enhancing communication was the merit of eating together. For those who live with others, the frequent answers in the merit of eating together other than these two answers (categorized as "others") were having regular time, a well-balanced diet and eating slowly to taste the meals. For those who live alone, the number of people was evenly distributed in the response options in the subcategories of "others." For personal value, most answered that they did not mind eating alone. The rate of people who selected that answer was higher in those living alone than in those living with others.

Table 3 presents the results of the modified Poisson regression. The prevalence ratio of having moderate psychological distress after the COVID-19 outbreak was higher with those who ate with others "4–5 times per week," "2–3 times per week," and "once a week" than those who ate with others "almost daily." The association was not significant with those who ate with others "less than once per week," but the prevalence ratio of having moderate psychological distress was lower than that of the groups who ate with others "4–5 times per week," "2–3 times per week," and "once per week." Adjusting covariates, including global fear and worry about COVID-19, did not

TABLE 1 Demographic characteristics of participants (*N* = 996)

	N (%)	Average (SD) Median (Min, Max)	Almost daily *N* (%)	4–5 times per week *N* (%)	2–3 times per week *N* (%)	Once per week *N* (%)	Less than once per week *N* (%)
Age (years)		43.0 (10.3) 43.0 (23.0, 61.0)					
20–29	113 (11)		92 (12)	6 (11)	6 (8.3)	4 (11)	5 (6.2)
30–39	286 (29)		206 (27)	16 (28)	29 (40)	11 (31)	24 (20)
40–49	279 (28)		202 (27)	17 (30)	24 (33)	12 (34)	24 (30)
50≤	318 (32)		252 (34)	18 (32)	13 (18)	8 (23)	27 (34)
Gender							
Men	520 (52)		404 (54)	30 (53)	37 (51)	17 (49)	32 (40)
Women	476 (48)		348 (46)	27 (47)	35 (49)	18 (51)	48 (60)
Living status							
Living alone	201 (20)		114 (15)	9 (16)	21 (29)	11 (31)	46 (57)
Living with others	795 (80)		638 (85)	48 (84)	51 (71)	24 (69)	34 (43)
Educational attainment (years)							
High school or less	254 (26)		195 (26)	15 (26)	14 (19)	8 (23)	22 (28)
Undergraduate	696 (70)		521 (69)	39 (68)	57 (79)	27 (77)	52 (65)
Postgraduate	46 (4.6)		36 (4.8)	3 (5.3)	1 (1.4)	0 (0)	6 (7.5)
Income (per year							
<5 million yen	314 (41)		215 (37)	18 (38)	26 (46)	13 (59)	42 (68)
5 million to 7.5 million yen	186 (24)		149 (26)	11 (28)	14 (25)	5 (23)	7 (11)
7.5 million to 10 million yen	148 (19)		116 (20)	10 (21)	10 (18)	3 (14)	9 (15)
>10 million yen	122 (16)		103 (18)	8 (17)	6 (11)	1 (4.5)	4 (6.5)
Missing	226		169	10	16	13	18
Working time	169 ()						
>40 h per week	608 (61)		459 (63)	37 (69)	40 (56)	19 (54)	53 (67)
<40 h per week	355 (36)		265 (37)	17 (31)	31 (44)	16 (46)	26 (33)
Missing	33		28	3	1	0	1
BMI							
>22	423 (42)		335 (45)	24 (42)	28 (39)	10 (29)	26 (32)
<22	573 (58)		417 (55)	33 (58)	44 (61)	25 (71)	54 (68)
Smoking							
Current smoker	176 (18)		129 (17)	11 (19)	13 (18)	6 (17)	17 (21)
Nonsmoker	820 (82)		623 (83)	46 (81)	59 (82)	29 (83)	63 (79)
Alcohol consumption							
Current drinker	601 (60)		450 (60)	33 (58)	45 (62)	21 (60)	52 (65)
Nondrinker	395 (40)		302 (40)	24 (42)	27 (38)	14 (40)	18 (35)
Residential area (total)							
State of emergency area [a]	636 (64)		463 (62)	37 (65)	51 (71)	22 (63)	63 (79)
Other area	360 (36)		289 (38)	20 (35)	21 (29)	13 (37)	17 (21)

(Continues)

TABLE 1 (Continued)

	N (%)	Average (SD) Median (Min, Max)	Almost daily *N* (%)	4–5 times per week *N* (%)	2–3 times per week *N* (%)	Once per week *N* (%)	Less than once per week *N* (%)
Residential area (living together)							
State of emergency area	486 (61)		384 (60)	30 (62)	35 (69)	12 (50)	25 (74)
Other area	309 (39)		254 (40)	18 (38)	16 (31)	12 (50)	9 (26)
Residential area (living alone)							
State of emergency area	150 (75)		79 (69)	7 (78)	16 (76)	10 (91)	38 (83)
Other area	51 (25)		35 (31)	2 (22)	5 (24)	1 (9.1)	8 (17)

[a]State of emergency area in February 2021, including Tochigi, Saitama, Tokyo, Kanagawa, Aichi, Gifu, Hyogo, Osaka, Kyoto, Fukuoka Prefecture.
Abbreviations: BMI, body mass index; SD, standard deviation.

attenuate the association. When we stratified by living status, among those who lived with others, the prevalence ratio of having moderate psychological distress was significantly higher in those who ate with others "4–5 times per week," "2–3 times per week," or "once per week" than in those who ate with others "almost daily." As for those who lived alone, though it was not significant, the prevalence ratio of moderate psychological distress in the "less than once per week" group was lower than in the "almost daily" group. The results of these analyses using complete data are shown in Supporting Information: Appendix 2. Most of the associations were similar to the data employing multiple imputation, although effect sizes were slightly higher in the complete data analysis. We additionally conducted sensitivity analysis by including those who usually skipped dinner. The results are shown in Supporting Information: Appendices 3 and 4. Similar to our results, the prevalence ratio of having moderate psychological distress was higher in those who ate with others "4–5 times per week," "2–3 times per week," and "once a week" than in those who ate with others "almost daily."

DISCUSSION

Our study showed that the prevalence ratio of having moderate psychological distress was higher in respondents who reported eating dinner with others "almost daily" than in those who ate with others "4–5 times," "2–3 times," and "once per week." However, we did not find a significant difference between the "almost daily" and "less than once per week" groups. This may imply that daily dinner with others has the least psychological distress among workers who eat dinner with others at least once a week. The association was not attenuated by global fear and worry about COVID-19. The result was different stratified by living status.

Among those living together, we observed the same tendency as in the overall analysis. Previous studies of systematic reviews in adolescents showed that frequent family meals were inversely associated with feelings of depression or thoughts of suicide in adolescents, highlighting the necessity of increasing family meal frequency.[5] When our study was conducted, the Japanese government promoted social preventive measures to self-restrain eating out after 8 p.m. As people living with others mostly lived with their family members (*N* = 784, 98.6%; Supporting Information: Appendix 5), they would have taken dinner with their family members. Hence our study also suggested the importance of having daily dinner with family members. However, in this sense, the prevalence ratio of having moderate psychological distress should have been the highest among those who ate with others less than once per week, but the result was inconsistent with our hypothesis. Since the difference in schedules was the main reason for eating alone for those living with others (Table 2), those who ate with others "less than once per week" may have experienced eating alone as a daily routine, giving the mere effect on mental health. Moreover, our data showed having a joyful time or enhancing communication as a merit of eating together (Table 2); therefore, other factors affecting mental health might exist. For instance, those who ate with others "less than once per week" may have substituted their joy of communication in different settings other than having dinner together to fulfill their mental health. In a Canadian study of adolescents, family mealtime frequency and mental health were partly mediated by parent–adolescent communication.[42] A Belgian study pointed out that on weekends, family members spend more time together at noon or in the daytime.[43] Therefore, participants of our study might have taken time to communicate at different times. During the pandemic, social preventive measures restricted people from eating with others face to face. Further study about the quantity of communication or social interaction with others is necessary for those who have less frequent meals with others.

As for those living alone, though it was not significant, the prevalence ratio of having moderate psychological distress was somewhat lower in those who ate with others "less than once per week" than in those who ate with others "almost daily." Some people might be used to or are comfortable eating alone. Previous studies pointed out that for some people, eating alone endorses positive

TABLE 2 Eating behaviors of the participants stratified by living status

	Living alone *N* (%)		Living with others *N* (%)		Overall *N* (%)	
	Before	After	Before	After	Before	After
Frequency of eating with others before/after COVID-19 outbreak						
Almost daily	120 (49)	114 (57)	640 (81)	638 (80)	760 (77)	752 (76)
4–5 times per week	6 (3.0)	9 (4.5)	47 (5.9)	48 (6.0)	53 (5.2)	62 (5.6)
2–3 times per week	16 (8.0)	21 (10)	45 (5.7)	51 (6.4)	61 (5.9)	72 (7.0)
1 time per week	17 (8.5)	11 (5.5)	23 (2.9)	24 (3.0)	40 (4.1)	35 (3.6)
<1 time per week	42 (21)	46 (23)	37 (4.7)	34 (4.3)	79 (7.9)	80 (7.8)
Usually skipped dinner	0 (0)	-	3 (0.4)	-	3 (0.3)	-
The reason for eating alone						
Difference of time and places	17 (8.5)		362 (46)		379 (39)	
No one to eat with	97 (48)		114 (14)		211 (21)	
Value personal time	41 (20)		68 (8.6)		109 (11)	
Convenient to eat alone	22 (11)		70 (8.8)		92 (8.8)	
As a daily routine	14 (7.0)		26 (3.3)		40 (4.1)	
Doing other things while eating	1 (0.5)		15 (1.9)		16 (1.4)	
Have no idea	6 (3.0)		131 (16)		137 (14)	
Others (free answer from participants)	3 (1.5)		9 (1.1)		10 (1.0)	
Living status leads to eating alone/together	1 (0.5)		4 (0.5)		5 (0.5)	
No reason	1 (0.5)		3 (0.4)		4 (0.4)	
Prioritizing to use smartphone	0 (0)		1 (0.1)		1 (0.1)	
Available to eat slowly	1 (0.5)		0 (0)		1 (0.1)	
Preventing the risk of infection	0 (0)		1 (0.1)		1 (0.1)	
Merit of eating with others						
Enjoying meals	60 (30)		278 (35)		338 (34)	
Deepening communication	83 (41)		276 (35)		359 (36)	
Others	58 (29)		241 (30)		299 (30)	
Possible to eat at regular times	4 (2.0)		34 (4.3)		38 (3.8)	
Possible to eat well-balanced diet	4 (2.0)		25 (3.1)		29 (2.9)	
Having safe and secured food	5 (2.5)		10 (1.3)		15 (1.5)	
Learning dining etiquette	1 (0.5)		10 (1.3)		11 (1.1)	
Telling tradition of meals to others	1 (0.5)		8 (1.0)		9 (0.9)	
Gaining knowledge and interest of food	5 (2.5)		12 (1.5)		17 (1.7)	
Participating in preparations (shopping, serving, and cooking food)	1 (0.5)		8 (1.0)		9 (0.9)	
Eating slowly to taste the meal	1 (0.5)		21 (2.6)		22 (2.2)	
Appreciating the nature and those who prepared meals	3 (1.5)		12 (1.5)		15 (1.0)	
Others (free answer from participants)	0 (0.0)		3 (0.4)		3 (0.3)	
Have no idea	33 (16)		98 (12)		131 (13)	
Personal value of eating alone						
Feel concerned	18 (9.0)		203 (26)		221 (22)	
Do not mind	178 (89)		561 (71)		739 (74)	
Have no idea	5 (2.5)		31 (3.9)		36 (3.6)	
Total	201 (100)		795 (100)		996 (100)	

TABLE 3 Association between psychological distress and dinner frequency with others in adult population of full-time employees in Japan

Frequency of eating dinner with others	Total *N* (%)	Moderate psychological distress *N* (%)	Model 1 PR (95%CI)	*p*	Model 2 PR (95%CI)	*p*	Model 3 PR (95%CI)	*p*	Model 4 PR (95%CI)	*p*
Overall										
Almost daily	752 (75.5)	344 (45.7)	1 (ref)	–	1 (ref)	–	1 (ref)	–	1 (ref)	–
4–5 times per week	57 (5.7)	35 (61.4)	1.34 (1.08–1.67)	0.008	1.35 (1.09–1.69)	0.007	1.35 (1.08–1.69)	0.008	1.35 (1.09–1.68)	0.006
2–3 times per week	72 (7.2)	46 (63.8)	1.40 (1.15–1.69)	<0.001	1.35 (1.10–1.64)	0.004	1.34 (1.10–1.65)	0.004	1.33 (1.09–1.64)	0.006
Once per week	35 (3.5)	23 (65.7)	1.44 (1.12–1.85)	0.005	1.46 (1.15–1.85)	0.002	1.45 (1.14–1.85)	0.003	1.42 (1.11–1.82)	0.005
Less than once per week	80 (8.0)	39 (48.8)	1.07 (0.84–1.35)	0.600	1.08 (0.86–1.36)	0.512	1.07 (0.84–1.36)	0.369	1.04 (0.82–1.33)	0.749
Total	996 (100)	487 (48.9)								
Living together										
Almost daily	638 (80.3)	287 (45.0)	1 (ref)	–	1 (ref)	–	1 (ref)	–		–
4–5 times per week	48 (6.0)	28 (58.3)	1.30 (1.01–1.67)	0.045	1.32 (1.03–1.71)	0.031	1.31 (1.02–1.70)	0.038	1.32 (1.03–1.69)	0.031
2–3 times per week	51 (6.4)	32 (62.7)	1.39 (1.11–1.75)	0.004	1.35 (1.06–1.72)	0.015	1.36 (1.07–1.74)	0.013	1.34 (1.05–1.72)	0.020
Once per week	24 (3.0)	15 (62.5)	1.39 (1.00–1.92)	0.045	1.55 (1.13–2.13)	0.006	1.56 (1.14–2.15)	0.006	1.50 (1.08–2.08)	0.015
Less than once per week	34 (4.3)	19 (55.9)	1.24 (0.91–1.70)	0.171	1.28 (0.94–1.73)	0.112	1.29 (0.95–1.74)	0.102	1.25 (0.92–1.70)	0.148
Total	795 (100)	381 (47.9)								
Living alone										
Almost daily	114 (56.7)	57 (50.0)	1 (ref)	–	1 (ref)	-	1 (ref)	–	1 (ref)	-
4–5 times per week	9 (4.5)	7 (77.8)	1.56 (1.05–2.31)	0.028	1.34 (0.89–2.01)	0.165	1.32 (0.87–2.00)	0.187	1.32 (0.87–2.01)	0.189
2–3 times per week	21 (10.4)	14 (66.7)	1.33 (0.94–1.90)	0.110	1.18 (0.82–1.71)	0.374	1.19 (0.82–1.72)	0.365	1.25 (0.87–1.80)	0.230
Once per week	11 (5.5)	8 (72.7)	1.45 (0.97–2.18)	0.070	1.20 (0.83–1.74)	0.343	1.08 (0.73–1.58)	0.703	1.13 (0.74–1.73)	0.560
Less than once per week	46 (22.9)	20 (43.5)	0.87 (0.60–1.27)	0.468	0.87 (0.60–1.24)	0.428	0.86 (0.60–1.24)	0.414	0.86 (0.60–1.23)	0.404
Total	201 (100)	106 (52.7)								

Note: Modified Poisson regression was performed with multiple imputation for missing data, showing prevalence ratios and 95% confidence intervals for psychological distress according to the categories with frequency of eating with others. Cut-off score of K6 ≧5 was used to define moderate psychological distress. Model 1 stands for crude model. Model 2 adjusted for gender, age, working time, global fear and worry about COVID-19. Model 3 additionally adjusted for educational attainment, smoking, alcohol, BMI, residential area. Model 4 additionally adjusted for income. For overall analysis, living status was also included in Model 3. We conducted the subgroup analysis stratified by living status.

Abbreviations: CI, confidence intervals; PR, prevalence ratio.

feelings because they can escape public scrutiny and can eat as they would like.[44] The Korean study indicated that the younger generation ate alone more frequently as a daily routine and felt freer when eating alone.[45] Our data also showed that the merit of eating together varied in those who lived alone than in those who lived with others (Table 2). For those who live alone, various ways of thinking may exist about eating alone and the situation may not be as stressful as for those who live with others. Moreover, since our participants who lived alone mostly ate dinner with others almost daily, the type of dinner meal companion may affect our analysis. For those living together, commensal eating could be the opportunity for social interaction with close companions, such as their family members or intimate partners. However, for those who live alone, dining with a reluctant person may occur. In the Korean study, those who ate dinner alone had greater odds of reporting depression than those who usually ate dinner with family members, but the association was not significant with those who usually had dinner with people other than family members.[45] We should further focus on the impact of living status along with meal companions to reveal underlying mechanisms of the association between eating alone and mental health.

Our result also showed that the association between dinner frequency with others and having moderate psychological distress was comparable after adjusting global fear and worry about COVID-19. One of the reasons might include that the frequency of eating with others did not drastically change before and after the pandemic in this population. Some studies have also shown that the majority of people in the general adult population did not change their eating behaviors during lockdown.[46,47] Even living alone, more than half of the participants living in state of emergency areas ate with others almost daily (Table 1). When our study was conducted, the Japanese government recommended using delivery or takeout food and closing the restaurants at an earlier time before 8 p.m. These social preventive measures emphasized avoiding contact in closed spaces, crowded spaces, and close contact settings. For those who live together, this public health message may allow them to maintain very frequent commensal meals by having dinner with their family members. For those who live alone, quitting dinner at an earlier time and using takeout food or delivery food could maintain the frequent meals. Traditionally in Japan, one of the most important roles of food was to bring people together and give them a sense of community. Sharing food strengthens bonds among family and friends by establishing intimacy in the social relationship. These consumption patterns and behaviors were even evident after the growing presence of fast-food cultures from foreign countries, which intended to be cheap and quick, indicating the importance of reinforcing emotive bonds among family and friends.[48] Our results may imply that commensal meals remained important under the pandemic among Japanese adults. Further study regarding the duration time of dinner, changes of food, dinner companion, or places to eat dinner would deepen the understanding of commensal meals regarding eating behaviors of Japanese adults.

The strength of our study is that it is the first study to examine the association between eating alone and psychological distress during the COVID-19 pandemic in the working population. We focused on the frequency of eating dinner with others to extract a clear effect of eating alone.

LIMITATIONS

Our study has several limitations. First, the nature of a cross-sectional study does not explain causal relationships. Therefore, poor mental status may lead some people to eat with others less frequently.

Second, some people who already seek new ways to avoid the situation of eating alone may exist. A French qualitative study during lockdown revealed that social distance rather strengthened people's social ties toward neighbors.[49] Therefore, the impact of the pandemic on eating alone and mental health may not be fully estimated by this study.

Third, residual confounding factors, such as type of meal companion (among those who ate with others almost daily but lived alone), duration of mealtime, places of taking meals, night shift work, social support, nutrition intake, and distance to the supermarket, were not assessed in this study. In particular, considering the effect of social support is a priority. Although eating with others is one of the most important social engagements for older people, working people would have more opportunities for social engagement than older people. In future study, we also may need to include the effect of social support at workplaces or at home.

Fourth, the questionnaire of global fear and worry about COVID-19 has no validity, so it may not fully extract the effect of the COVID-19 pandemic as a confounder. Moreover, the questionnaire asking about meal frequency with others is a one-point scale and subjective, and lacks validation. For personal value of eating alone, the possible answers that were revised from the answers from the white paper of Shokuiku ("Dietary Education" in English) in Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF, Japan)[36] questionnaire may lead to social desirability bias that eating alone is an unpreferable behavior.

Fifth, the prevalence of moderate psychological distress was higher than the average of 25% in Japan[50] and the participants were higher in education. Therefore, our result may not be generalized to all working populations in Japan. Moreover, cultural differences between other countries in eating behavior remain. For example, cross-cultural analysis of eating alone among young adults in Australia and Japan revealed that cross-cultural variation and complexity exist in the context of eating alone, including location and timing of eating alone, the range of fast-food cultures, work and life environments, and public health nutrition programs.[51] In the cross-sectional study in the Republic of Chile, which analyzed the association between frequency of family meal and subjective health, tea time in addition to three meals was also included in the study.[7] We should also take cultural differences of eating together into

account. Last, the sample size of the population was small and lacked the power to estimate the analysis, particularly for those living alone.

CONCLUSION

We can conclude that respondents who ate with others "almost daily" had the least psychological distress among those who ate with others at least once a week. The association remained comparable after adjusting for global fear and worry about COVID-19. Further study is needed on why the prevalence ratio of having mental distress was lower with those who ate with others less than once a week.

AUTHOR CONTRIBUTIONS

Conception and design: Rikako Tsuji, Norito Kawakami., and Daisuke Nishi. *Acquisition of data*: Rikako Tsuji and Natsu Sasaki. *Interpretation of data*: Rikako Tsuji, Hiroto Akiyama, Norito Kawakami, and Daisuke Nishi. Reiko Kuroda, Kanami Tsuno, and Kotaro Imamura ensured that the study was appropriately investigated and resolved. Rikako Tsuji participated in writing the manuscript. All authors have critically read and approved the manuscript. The manuscript has not been previously published nor is being considered for publication elsewhere.

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CONFLICT OF INTEREST

Daisuke Nishi has received personal fees from Startia Inc., en-power Inc., MD.net (http://www.md.net), and Mitsubishi Heavy Industries Kobe Shipyard outside the submitted work. Natsu Sasaki reports personal fees from Medilio Co., Ltd., outside the submitted work. Reiko Kuroda reports grants from Grant-in-Aid for Young Scientists (B) from Japan Society for the Promotion of Science (JSPS), personal fees from SATORI electric CO., LTD, NXP Semiconductors, RIKEN, Toyotsu Chemiplas, Mitsubishi Materials Corporation, outside the submitted work. Kotaro Imamura and Norito Kawakami are employed at the Department of Digital Mental Health, an endowment department supported with an unrestricted grant from 15 enterprises (https://dmh.m.u-tokyo.ac.jp/c), outside the submitted work. Norito Kawakami reports grants from SB AtWork Corp., Fujitsu Ltd., and TAK Ltd., personal fees from the Occupational Health Foundation, SB AtWork Corp., RIKEN, Japan Aerospace Exploration Agency (JAXA), Japan Dental Association, Sekisui Chemicals, Junpukai Health Care Center, and the Osaka Chamber of Commerce and Industry, all outside the submitted work. The remaining authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

ETHICS APPROVAL STATEMENT

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Research Ethics Committee of The University of Tokyo (No.10856-(2), (3), (4), (5), (6)).

PATIENT CONTENT STATEMENT

Informed consent was obtained from all individual participants included in the study, and the anonymity of the participants was ensured.

CLINICAL TRIAL REGISTRATION

N/A.

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REFERENCES

1. Sobal J, Nelson MK. Commensal eating patterns: a community study. Appetite. 2003;41(2):181–90. https://doi.org/10.1016/s0195-6663(03)00078-3
2. Chae W, Ju YJ, Shin J, Jang S-I, Park E-C. Association between eating behaviour and diet quality: eating alone vs. eating with others. Nutr J. 2018;17(1):117. https://doi.org/10.1186/s12937-018-0424-0
3. Vesnaver E, Keller HH, Sutherland O, Maitland SB, Locher JL. Alone at the table: food behavior and the loss of commensality in widowhood. J Gerontol B Psychol Sci Soc Sci. 2016;71(6):1059–69. https://doi.org/10.1093/geronb/gbv103
4. Choi M-J, Park YG, Kim YH, Cho KH, Nam GE. Eating together and health-related uality of life among korean adults. J Nutr Educ Behav. 2020;52(8):758–65. https://doi.org/10.1016/j.jneb.2019.11.013
5. Harrison ME, Norris ML, Obeid N, Fu M, Weinstangel H, Sampson M. Systematic review of the effects of family meal frequency on psychosocial outcomes in youth. Can Fam Physician. 2015;61(2):96–106. https://www.ncbi.nlm.nih.gov/pubmed/25676655
6. Ishikawa M, Yokoyama T, Hayashi F, Takemi Y, Nakaya T, Fukuda Y, et al. Subjective well-being is associated with food behavior and demographic factors in chronically ill older japanese people living alone. J Nutr Health Aging. 2018;22(3):341–53. https://doi.org/10.1007/s12603-017-0930-3

7. Schnettler Morales B, Denegri Coria M, Miranda Vargas H, Sepúlveda Maldonado J, Mora González M, Lobos Andrade G. Satisfaction with life and with food-related life in central Chile. Psicothema. 2014;26(2):200–6. https://doi.org/10.7334/psicothema2013.13
8. Yiengprugsawan V, Banwell C, Takeda W, Dixon J, Seubsman S, Sleigh AC. Health, happiness and eating together: what can a large Thai cohort study tell us? Glob J Health Sci. 2015;7(4):270–7. https://doi.org/10.5539/gjhs.v7n4p270
9. Kniffin KM, Wansink B, Devine CM, Sobal J. Eating together at the firehouse: how workplace commensality relates to the performance of firefighters. Hum Perform. 2015;28(4):281–306. https://doi.org/10.1080/08959285.2015.1021049
10. Nicholls R, Perry L, Duffield C, Gallagher R, Pierce H. Barriers and facilitators to healthy eating for nurses in the workplace: an integrative review. J Adv Nurs. 2017;73(5):1051–65. https://doi.org/10.1111/jan.13185
11. Gupta CC, Coates AM, Dorrian J, Banks S. The factors influencing the eating behaviour of shiftworkers: what, when, where and why. Ind Health. 2019;57(4):419–53. https://doi.org/10.2486/indhealth.2018-0147
12. Takeda W, Melby MK, Ishikawa Y. Who eats with family and how often? Household members and work styles influence frequency of family meals in urban Japan. Appetite. 2018;125:160–71. https://doi.org/10.1016/j.appet.2018.02.011
13. Carroll N, Sadowski A, Laila A, Hruska V, Nixon M, Ma D, et al. The impact of COVID-19 on health behavior, stress, financial and food security among middle to high income Canadian families with young children. Nutrients. 2020;12(8):2352. https://doi.org/10.3390/nu12082352
14. Kimura Y, Wada T, Okumiya K, Ishimoto Y, Fukutomi E, Kasahara Y, et al. Eating alone among community-dwelling Japanese elderly: association with depression and food diversity. J Nutr Health Aging. 2012;16(8):728–31. https://doi.org/10.1007/s12603-012-0067-3
15. Kuroda A, Tanaka T, Hirano H, Ohara Y, Kikutani T, Furuya H, et al. Eating alone as social disengagement is strongly associated with depressive symptoms in Japanese community-dwelling older adults. J Am Med Dir Assoc. 2015;16(7):578–85. https://doi.org/10.1016/j.jamda.2015.01.078
16. Tani Y, Sasaki Y, Haseda M, Kondo K, Kondo N. Eating alone and depression in older men and women by cohabitation status: the JAGES longitudinal survey. Age Ageing. 2015;44(6):1019–26. https://doi.org/10.1093/ageing/afv145
17. Wang X, Shen W, Wang C, Zhang X, Xiao Y, He F, et al. Association between eating alone and depressive symptom in elders: a cross-sectional study. BMC Geriatr. 2016;16:19. https://doi.org/10.1186/s12877-016-0197-2
18. Takase M, Murayama H, Hirukawa S, Sugimoto M, Ono S, Tanaka T, et al. Which aspects of dining style are associated with depressive mood? A Study at an assisted living facility in Japan. J Nutr Gerontol Geriatr. 2019;38(4):377–86. https://doi.org/10.1080/21551197.2019.1662356
19. Choi S, Yang ECL, Tabari S. Solo dining in Chinese restaurants: a mixed-method study in Macao. Int J Hosp Manag. 2020;90:102628. https://doi.org/10.1016/j.ijhm.2020.102628
20. Kim Y, Lee E, Lee H. Characteristics of eating alone affecting the stress, depression, and suicidal ideation. Community Ment Health J. 2020;56(8):1603–9. https://doi.org/10.1007/s10597-020-00621-8
21. Miki T, Eguchi M, Kochi T, Akter S, Inoue Y, Yamaguchi M, et al. Eating alone and depressive symptoms among the Japanese working population: the Furukawa nutrition and health study. J Psychiatr Res. 2021;143:492–8. https://doi.org/10.1016/j.jpsychires.2020.10.048
22. Vesnaver E, Keller HH. Social influences and eating behavior in later life: a review. J Nutr Gerontol Geriatr. 2011;30 (1):2–23.
23. Rogers AM, Lauren BN, Woo Baidal JA, Ozanne EM, Hur C. Persistent effects of the COVID-19 pandemic on diet, exercise, risk for food insecurity, and quality of life: a longitudinal study among U.S. adults. Appetite. 2021;167:105639. https://doi.org/10.1016/j.appet.2021.105639
24. Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. J Affect Disord. 2020;277:55–64. https://doi.org/10.1016/j.jad.2020.08.001
25. Nochaiwong S, Ruengorn C, Thavorn K, Hutton B, Awiphan R, Phosuya C, et al. Global prevalence of mental health issues among the general population during the coronavirus disease-2019 pandemic: a systematic review and meta-analysis. Sci Rep. 2021;11(1):10173. https://doi.org/10.1038/s41598-021-89700-8
26. Chu DK, Akl EA, Duda S, Solo K, Yaacoub S, Schünemann HJ, et al., Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. Lancet. 2020;395(10242):1973–87. https://doi.org/10.1016/S0140-6736(20)31142-9
27. Kushida O, Moon J-S, Matsumoto D, Yamasaki N, Takatori K. Eating alone at each meal and associated health status among community-dwelling Japanese elderly living with others: a cross-sectional analysis of the KAGUYA Study. Nutrients. 2020;12(9):2805. https://doi.org/10.3390/nu12092805
28. Murakami K, Shinozaki N, Livingstone MBE, Fujiwara A, Asakura K, Masayasu S, et al. Characterisation of breakfast, lunch, dinner and snacks in the Japanese context: an exploratory cross-sectional analysis. Public Health Nutr. 2020;25:689–701. https://doi.org/10.1017/S1368980020004310
29. St-Onge M-P, Ard J, Baskin ML, Chiuve SE, Johnson HM, Kris-Etherton P, et al. Meal timing and frequency: implications for cardiovascular disease prevention: a scientific statement from the American Heart Association. Circulation. 2017;135(9):e96–e121. https://doi.org/10.1161/CIR.0000000000000476
30. Pendergast FJ, Livingstone KM, Worsley A, McNaughton SA. Correlates of meal skipping in young adults: a systematic review. Int J Behav Nutr Phys Act. 2016;13(1):125. https://doi.org/10.1186/s12966-016-0451-1
31. Nyberg M, Lennernäs Wiklund M. Impossible meals? The food and meal situation of flight attendants in Scandinavia – a qualitative interview study. Appetite. 2017;113:162–71. https://doi.org/10.1016/j.appet.2017.02.033
32. Scander H, Lennernäs Wiklund M, Yngve A. Assessing time of eating in commensality research. Int J Environ Res Public Health. 2021;18(6):2941. https://doi.org/10.3390/ijerph18062941
33. Mestdag I, Glorieux I. Change and stability in commensality patterns: a comparative analysis of Belgian time-use data from 1966, 1999 and 2004. Sociol Rev. 2009;57(4):703–26. https://doi.org/10.1111/j.1467-954X.2009.01868.x
34. Yates L, Warde A. Eating together and eating alone: meal arrangements in British households. Br J Sociol. 2017;68(1):97–118. https://doi.org/10.1111/1468-4446.12231
35. Vandenbroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. PLoS Med. 2007;4(10):e297. https://doi.org/10.1371/journal.pmed.0040297
36. Ministry of Agriculture, Forestry and Fisheries (2021). *The Survey of Attitudes Towards Shokuiku*. Accessed November 20, 2022. https://www.maff.go.jp/j/syokuiku/ishiki/h30/pdf/houkoku_3.pdf
37. Prochaska JJ, Sung H-Y, Max W, Shi Y, Ong M. Validity study of the K6 scale as a measure of moderate mental distress based on mental health treatment need and utilization. Int J Methods Psychiatr Res. 2012;21(2):88–97. https://doi.org/10.1002/mpr.1349

38. Furukawa TA, Kawakami N, Saitoh M, Ono Y, Nakane Y, Nakamura Y, et al. The performance of the Japanese version of the K6 and K10 in the World Mental Health Survey Japan. Int J Methods Psychiatr Res. 2008;17(3):152–8. https://doi.org/10.1002/mpr.257
39. Sasaki N, Kuroda R, Tsuno K, Kawakami N. Workplace responses to COVID-19 associated with mental health and work performance of employees in Japan. J Occup Health. 2020;62(1):e12134. https://doi.org/10.1002/1348-9585.12134
40. Zou G. A modified poisson regression approach to prospective studies with binary data. Am J Epidemiol. 2004;159(7):702–6. https://doi.org/10.1093/aje/kwh090
41. Rubin DB. Multiple imputation for nonresponse in surveys. New York:John Wiley & Sons; 2004. https://play.google.com/store/books/details?id=bQBtw6rx_mUC
42. Elgar FJ, Craig W, Trites SJ. Family dinners, communication, and mental health in Canadian adolescents. J Adolesc Health. 2013;52(4):433–8. https://doi.org/10.1016/j.jadohealth.2012.07.012
43. Mestdag I, Vandeweyer J. Where has family time gone? In search of joint family activities and the role of the family meal in 1966 and 1999. J Fam Hist. 2005;30(3):304–23. https://journals.sagepub.com/doi/abs/10.1177/0363199005275794?casa_token=58Y3uLNl8C4AAAAA:gN7M_jFaVI58geo9SGVKhFrmMSVLroR7xDm4iiY_eDDAyO2-LMBoZofZX3xvvs7NmaJmPxGVrKNswQ
44. Pliner P, Bell R. 9 - A table for one: the pain and pleasure of eating alone. In: Meiselman HL editor. Meals in science and practice. Cambridge: Woodhead Publishing; 2009. p. 169–89. https://doi.org/10.1533/9781845695712.4.169
45. Lee SA, Park E-C, Ju YJ, Nam JY, Kim TH. Is one's usual dinner companion associated with greater odds of depression? Using data from the 2014 Korean National Health and Nutrition Examination Survey. Int J Soc Psychiatry. 2016;62(6):560–8. https://doi.org/10.1177/0020764016654505
46. Herle M, Smith AD, Bu F, Steptoe A, Fancourt D. Trajectories of eating behavior during COVID-19 lockdown: longitudinal analyses of 22,374 adults. Clin Nutr ESPEN. 2021;42:158–65. https://doi.org/10.1016/j.clnesp.2021.01.046
47. Poelman MP, Gillebaart M, Schlinkert C, Dijkstra SC, Derksen E, Mensink F, et al. Eating behavior and food purchases during the COVID-19 lockdown: a cross-sectional study among adults in the Netherlands. Appetite. 2021;157:105002. https://doi.org/10.1016/j.appet.2020.105002
48. Traphagan JW, Brown LK. Fast food and intergenerational commensality in Japan: new styles and old patterns. Ethnology. 2002;41(2):119–34. https://doi.org/10.2307/4153002
49. Fourat E, Fournier T, Lepiller O. Reflection: snatched commensality: to eat or not to eat together in times of Covid-19 in France. Food Foodways. 2021;29(2):204–12. https://doi.org/10.1080/07409710.2021.1901383
50. Nishi D, Susukida R, Usuda K, Mojtabai R, Yamanouchi Y. Trends in the prevalence of psychological distress and the use of mental health services from 2007 to 2016 in Japan. J Affect Disord. 2018;239:208–13. https://doi.org/10.1016/j.jad.2018.07.016
51. Takeda W, Melby MK. Spatial, temporal, and health associations of eating alone: a cross-cultural analysis of young adults in urban Australia and Japan. Appetite. 2017;118:149–60. https://doi.org/10.1016/j.appet.2017.08.013

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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