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A longitudinal study on changes in food parenting practices during COVID-19 and the role of parental well-being

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ARTICLE INFO

Keywords:

Food parenting
Adolescents
Parental mental health
COVID-19 stress
Longitudinal design

ABSTRACT

The COVID-19 pandemic may negatively influence food parenting practices, also among parents of adolescents. Parental well-being (stress and depressive symptoms) may explain these COVID-19 related changes in food parenting practices (snack structure, healthy structure, modeling, autonomy support, and coercive control). However, most previous studies performed before or during the COVID-19 pandemic have been limited by cross-sectional designs. The aim of the current study among parents of adolescent children was twofold. First, we aimed to examine prospective differences in food parenting practices comparing the situation before and during COVID-19. Second, we aimed to examine both cross-sectional and longitudinal associations between parental well-being and the dimensions of food parenting, while additionally examining whether these prospective associations were more pronounced in parents who had experienced more COVID-19 stressful life events. Parents ($N = 290$; 74.9% female; at baseline: $M_{\text{age}} = 46.9$; $SD_{\text{age}} = 4.3$) of adolescent children (at baseline: $M_{\text{age}} = 14.3$; $SD_{\text{age}} = 0.6$) completed online surveys about parental well-being and food parenting twice: One year before the COVID-19 pandemic (spring 2019) and during the COVID-19 pandemic, 1.5 years after the first measurement (autumn 2020). In general, we found consistent evidence for an average decrease in food autonomy support and an increase in coercive control during COVID-19. However, parental well-being did not seem to explain (changes in) food parenting practices during COVID-19, also not in combination with stressful life events. Our findings suggest that, regardless of parental well-being, the general COVID-19 situation had some small negative influences on autonomy support and coercive control among parents of adolescents. These findings might be explained by parents being more often confronted with unhealthy eating occasions in the COVID-19 home context, triggering these negative parental responses.

1. Introduction

On March 11, 2020, the World Health Organization declared the outbreak of the COVID-19 virus a pandemic (WHO, 2020). While some pandemic-related stressors influence nearly everyone, some may especially affect parents and family life (Weeland, Keijsers, & Branje, 2021). Both parents and children were at home more often and parents were often attempting to work remotely whilst children were at home. As such, the COVID-19 pandemic can be regarded as a social experiment in which many families have been exposed to more stressful situations and life events than before the pandemic (Klaiber, Wen, DeLongis, & Sin, 2021; Rossi, Jannini, Succi, Pacitti, & Lorenzo, 2021). Thus, it is not surprising that research has shown increasing subjective stress rates and higher levels of depressive symptoms during the pandemic compared

with the pre-pandemic period (Achterberg, Dobbelaar, Boer, & Crone, 2021; Bendau et al., 2021). However, less is known on whether and how the COVID-19 pandemic may affect food parenting practices (i.e., context-specific acts of parenting concerning food and eating to socialize children toward certain behaviors). This is an important topic because: (1) parents and children were at home more often, providing increased opportunities for food parenting interactions, and (2) parental well-being (i.e., parental stress and depressive symptoms) may influence food parenting practices.

Specifically, low parental well-being (i.e., more stress and depressive symptoms) may increase the use of easier and shorter-term coping strategies to manage children's eating behaviors, to acquire and prepare meals, and to provide nutrition explanation or nutrition rules in an authoritative way (Koning, Vink, Renders, et al., 2021). As such,

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<https://doi.org/10.1016/j.appet.2022.106331>

Received 4 April 2022; Received in revised form 9 September 2022; Accepted 27 September 2022

Available online 1 October 2022

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parental stress and depressive symptoms may impact all three overarching dimensions of food parenting, resulting in more coercive control (e.g., using food to manage child emotions or behaviors), less structure (e.g., setting snacking rules, modeling and creating a healthy environmental structure), and less autonomy support (e.g., teaching the adolescent about nutrition, providing feedback with regard to own eating, and explaining certain eating rules; (Gevers, Kremers, de Vries, & van Assema, 2014; Koning, Vink, Notten, et al., 2021; Vaughn et al., 2016). In general, structure and autonomy-supportive forms of food parenting practices are regarded as effective as they are associated with more healthy child eating and weight outcomes. In contrast, coercive controlling practices are associated with more unhealthy outcomes (Beckers, Karszen, Vink, Burk, & Larsen, 2020; Yee, Lwin, & Ho, 2017).

To date, two longitudinal studies among preschool-aged children suggest that the quality of food parenting practices and feeding interactions have generally worsened during the pandemic (Cerniglia, Tambelli, Trombini, Andrei, & Cimino, 2021; Loth et al., 2021). Similarly, decreases in both autonomy supportive and structure, and increases in coercive controlling food parenting practices might be expected among parents of adolescent children. Adolescence is a time of growing independence, also regarding (unhealthy) food intake (Fitzgerald, Heary, Nixon, & Kelly, 2010; McKeown & Nelson, 2018; Ziegler et al., 2021). Due to the COVID-19-restrictions, adolescents spent more time with their parents (Bülow, Keijsers, Boele, van Roekel, & Denissen, 2021). As such, parents might have been more often confronted with unhealthy eating occasions (e.g., the consumption of unhealthy nutrient-poor snacks; Larson, Story, Eisenberg, & Neumark-Sztainer, 2016) at home, previously mainly taking place at school and with peers (Garrido-Fernández et al., 2020). This might have led to increased food parenting challenges. Recent studies among (parents of) adolescents suggest that food parenting practices may also impact food intake and, moreover, the development of disordered eating behaviors in this older age group specifically (Blaine, Kachurak, Davison, Klabunde, & Fisher, 2017; Christensen, 2019; Fleary & Ettienne, 2019; Koning, Vink, Renders, et al., 2021; Taylor, Ditch, & Hansen, 2018). However, to the best of our knowledge, there are no longitudinal studies comparing food parenting practices before and during COVID-19 among parents of adolescents. The current study filled this gap.

Moreover, the current study investigates unique longitudinal links between parental well-being (i.e., stress and depressive symptoms) and food parenting, while controlling for baseline food parenting. Previous cross-sectional research (both before or during COVID-19) among parents of younger children suggested that parental stress and depressive symptoms are generally associated with the use of less effective (i.e., less structure and autonomy support) and more ineffective (i.e., more coercive control) food parenting practices (Elias et al., 2016; Goulding et al., 2014; Haycraft, 2020; Jansen et al., 2021; Wang, Devjani, Chillakanti, Dunton, & Mason, 2021). In our previous study among parents of adolescents performed before the COVID-19 pandemic, we found similar concurrent associations. In addition, we found an association between baseline levels of parental stress and food parenting practices one and a half years later (Koning, Vink, Renders, et al., 2021). Specifically, we found that parents reporting more stress at baseline subsequently used less autonomy support. However, in our previous study, we could not control for baseline food parenting constructs, as we only had one measure of food parenting available. In the meantime, we have conducted a follow-up measure of parent-reported food parenting practices. So, we could now investigate prospective associations involving food parenting practices.

Finally, we considered individual differences with regard to the impact of the COVID-19 situation, as the pandemic was not equally stressful for all parents (Weeland et al., 2021). There are, for instance, positive reports from parents about increasing time available to spend on high-quality family life (Brown, Doom, Lechuga-Peña, Watamura, & Koppels, 2020). The COVID-19 pandemic seems to have had the most prominent negative effects on the mental well-being of parents who

experienced more stress and depressive symptoms than before the COVID-19 situation (Achterberg et al., 2021; Brown et al., 2020). This seems to be in line with findings from some previous pre-COVID-19 studies suggesting that one or more stressful life events, such as loss of employment, can precipitate the recurrence of previous depressive symptoms (Roca et al., 2013; You & Conner, 2009). Considering that parents' mental health problems seem to negatively impact children's health-related outcomes (Lampard, Franckle, & Davison, 2014), we expected that pre-COVID-19 parental stress and depressive symptoms may precede their use of less effective food parenting practices during COVID-19, and this association would be most pronounced among parents who experienced more stressful life events during the COVID-19 pandemic.

To conclude, the aim of the current longitudinal study among parents of adolescent children was twofold. First, we aimed to examine prospective differences in food parenting practices before and during COVID-19. Second, we aimed to examine (longitudinal) associations between parental well-being and the various dimensions of food parenting, while additionally examining whether these associations were more pronounced in parents who had experienced more COVID-19 stressful life events. We hypothesized that parents would report less effective (i.e., less structure and autonomy support) and more ineffective (i.e., more coercive control) food parenting practices during COVID-19 compared to before COVID-19. Moreover, it was expected that lower parental well-being (i.e., more stress and depressive symptoms) would be associated with less effective and more ineffective food parenting practices, both cross-sectionally and longitudinally, with longitudinal associations being more prominent among parents having experienced more COVID-19 stressful life events.

2. Methods

The procedures and data analyses for this paper were pre-registered on the Open Science Framework (OSF; <https://doi.org/10.17605/OSF.IO/8YHRT>). Moreover, more details about the larger longitudinal study can be found at OSF as well (<https://osf.io/bysgq/>).

2.1. Participants and procedure

Participants (i.e., parents of adolescent children) in the current study were part of the "G(F)OOD together" research project, a longitudinal study on mental health and health behaviors of both adolescents and parents in the Netherlands. Data for the first three waves (i.e., before the COVID-19 situation) were collected in fall 2017, spring 2018, and spring 2019. Moreover, three follow-up waves have been collected during the COVID-19 pandemic in fall 2020 (Wave 4), spring 2021 (Wave 5) and fall 2021 (Wave 6). Six secondary schools participated in Wave 1, and one additional school was included from Wave 2 onwards. All adolescents attending the first and second grade (corresponding to US Grade 7 and 8), and their parents, were invited to participate in this study by means of an active parental consent procedure. Parents provided written consent for themselves and their adolescent children to participate in the study and completed online questionnaires themselves. The online parental questionnaires were administered through Qualtrics Survey Software (Qualtrics, Provo, UT, USA). Adolescents received a small gift for their participation. Among participating parents, several prizes were raffled. Specifically, thirty-four gift vouchers (values: 5 to 50 euros), and three weekend getaways (value: 250 euros) were raffled among the participating families at the end of waves 1 to 4. The study was conducted in accordance with the Declaration of Helsinki. In 2017, the Ethics Committee of the Faculty of Social Sciences of the Radboud University, Nijmegen, the Netherlands, approved the ("G(F)OOD together") study protocol with the first four survey waves (reference number ECSW20170805-516), of which the last wave had been postponed due to the COVID-19 pandemic. Further details on the "G(F)OOD together" study design can be found elsewhere (Koning, Vink, Visscher,

& Larsen, 2021; van den Broek, Larsen, Verhagen, Burk, & Vink, 2020).

We only used data from parents who participated in both Wave 3 (spring 2019) and Wave 4 (autumn 2020), as these are the only two time points within this project at which parent-reported food parenting data have been collected. In addition, we used Wave 1 and Wave 2 data to gather information on parental educational level, which was not measured again during follow-up waves. The data of adolescents were not used in this study, as adolescent children only reported once (i.e., at Wave 3) on their parents' food parenting practices. In total, 467 parents took part in Wave 3 and 380 parents took part in Wave 4 (of which 322 parents also participated at Wave 3). We aimed to include data from both fathers and mothers. When two caregivers of a child both participated and one caregiver identified as a father, the father's data was included to ensure the largest possible sample of fathers in the study sample. As a result, our sample with Wave 3 and 4 data ($N = 322$) consisted of $N = 290$ cases (72 fathers and 218 mothers). Notably, attrition analyses showed that these 290 parents included at Wave 4 did not significantly differ from parents ($N = 176$) participating only at baseline with regard to main characteristics (i.e., parenting well-being and food parenting practices) and covariates (i.e., parental education, BMI, gender or child age; all $p < .05$).

Most of the parents were born in the Netherlands (> 95%). At Wave 3, the mean age of mothers was 46.4 years ($SD_{\text{age}} = 4.0$; age range = 31.2 to 55.7) and fathers' mean age was 49.1 years ($SD_{\text{age}} = 4.2$; age range = 39.3 to 58.6), while the mean age of adolescents was 14.3 years ($SD_{\text{age}} = 0.6$). Most parents, particularly fathers, had completed higher vocational training or university (fathers: 79.4%; mothers: 54.8%). Mean Body Mass Index (BMI) values (i.e., based on self-reported height and weight values) were 25.6 ($SD_{\text{BMI}} = 3.3$; BMI range = 19.4 to 35.8) and 25.0 ($SD_{\text{BMI}} = 4.9$; BMI range = 17.7 to 43.8) for fathers and mothers, respectively. For sake of clarity, from now on, Wave 3 (i.e., collected before COVID-19) and Wave 4 (i.e., collected approximately 1.5 years after Wave 3, during COVID-19) will be referred to as baseline or pre-COVID-19 (Wave 3) and follow-up or COVID-19 (Wave 4), respectively.

2.2. Measures

2.2.1. Depressive symptoms

Parental depressive symptoms were assessed with the 10-item short version of the Center for Epidemiological Studies-Depression (CES-D) scale. The CES-D is widely used and has adequate internal reliability (Andresen, Malmgren, Carter, & Patrick, 1994). Respondents rated items on a 4-point Likert scale (scored 0–3, ranging from “rarely or none”, to “most or all the time”). The scale includes positive (“I was happy”) and negative (“I could not get going”) items. Higher total CES-D scores reflect greater parental depressive symptomatology. In the current study, Cronbach's alpha for the CES-D was 0.81 at baseline and 0.80 at follow-up.

2.2.2. Stress

Parental stress levels were assessed using 4 items from the Perceived Stress Scale (PSS-4), which is a short version of the original PSS with adequate psychometric properties for assessing stress perception levels in the general population (Vallejo, Vallejo-Slocker, Fernández-Abascal, & Mañanes, 2018). The instrument contains 4 statements which measure how unpredictable and uncontrollable respondents feel their lives are, for example: “In the last month, how often have you felt confident about your ability to handle your personal problems?” Respondents rate how often they experience stressful situations on a 5-point Likert scale ranging from “never” (score 1) to “very often” (score 5). Answers of the 4 items were summed into a total PSS score. The higher the score on the PSS, the greater the respondent perceives that their demands exceed their ability to cope. Cronbach's alpha for this measure was 0.71 at baseline and 0.70 at follow-up.

2.2.3. Food parenting practices

Food parenting practices were measured using the Adolescent Food Parenting Questionnaire parent version (AFPQ-p). The 16-item AFPQ measures effective (i.e., structure and autonomy support) and ineffective (i.e., coercive control) food parenting constructs, whereby structure is divided in three separate constructs (i.e., snack structure; healthy structure; and modeling) (Koning, Vink, Notten, et al., 2021). For each item, answers were given on a 5-point Likert scale including “disagree” (score 1), “slightly disagree” (score 2), “impartial” (score 3), “slightly agree” (score 4), and “agree” (score 5). Cronbach's alphas in the current study for food parenting constructs at baseline and follow-up were adequate: *Coercive control*: 0.82 and 0.81; *Autonomy support*: 0.83 and 0.79; *Modeling*: 0.73 and 0.77; *Healthy structure*: 0.70 and 0.75; and *Snack structure*: 0.72 and 0.73. Most food parenting variables showed rather normal distributions, with the exception of the healthy structure variable, which was severely skewed in this sample. As such, we decided to dichotomize this variable into a new variable with values of 1 (parents with a score of 5) and 0 (parents with a score of less than 5), as most parents (> 75%) scored 5 on this measure. In total, 23.8% of the parents at baseline and 20.3% of the parents at follow-up scored 0 on this dichotomized healthy structure variable.

2.2.4. COVID-19 stressful life events

We developed a COVID-19 stressful life event scale list for adults. A previous checklist was used as a first inspiration to collect data on the experience of general negative (stressful) life events (provided at [Leven gebeurtenissen vragenlijst Garnefski Kraaij 2001 \(universiteitleiden.nl\)](https://www.leven.vragenlijst.garnefski.kraaij2001.universiteitleiden.nl); Garnefski, Kraaij, & Spinhoven, 2001). We have added COVID-19-specific events to this Dutch questionnaire and deleted early lifetime stressors (e.g., on divorce of their parents during childhood). Moreover, we changed the instructions about lifetime events into two more recent time periods that were relevant to the pandemic. The specific instruction was: “Did you experience one of the following events in 2019 until March 2020 (before COVID-19) and/or from March 2020 until now (during COVID-19). If you did not experience a particular event in any of these periods, please check the box *not happened*.” The following eight life events were assessed: death of close relative, serious conflicts/quarrels in the family, divorce (self), unemployment or having less work than before, problems with housing conditions (e.g. too small, noise, too busy, too few computers/laptops to work on at home at the same time), family member being seriously or long-term ill or having other serious problems (e.g. problems with alcohol, burnout, depression or anxiety), debt counseling (e.g., receiving debt counseling or having large outstanding debts other than a mortgage), and important planned events (such as a wedding party, distant trip) that had to be canceled due to circumstances. If the yes box was checked for the specific periods before and during COVID-19 (i.e., 2019 until March 2020 or from March 2020 until autumn 2020), the response was scored as 1. If not, the response was scored as 0. A total number of negative stressful life events was obtained by summing the responses for a specific period (possible range: 0–8). Higher scores refer to a higher amount of stressful life events. For the COVID-19 period, this sum score showed a rather normal distribution (0–8 range). This variable was therefore treated as a continuous variable in our analyses. However, for the before COVID-19 period this score was not normally distributed (with 69.1% of parents reporting no life events, 22.9% reporting only 1 life event, and the rest of parents scoring 2 or 3 life events). As such, we dichotomized this pre-COVID-19 variable into parents who did not (score = 0) versus those who did (score = 1) report stressful life events during the period from 2019 until March 2020 (when the COVID-19 pandemic started).

2.2.5. Covariates

Besides controlling for baseline food parenting practices and pre-COVID-19 life events, the following covariates were included in the present study: Parental educational level, parental BMI, parental gender, and the age and gender of the child for which they filled out the

questionnaire, given previous associations of these variables with food parenting (Balantekin et al., 2020; Davison, Haines, Garcia, Douglas, & McBride, 2020; Patel, Karasouli, Shuttlewood, & Meyer, 2018; Sano, Routh, & Lanigan, 2019). In the questionnaires at Wave 1 and 2, parents indicated their highest achieved level of education from six answering level options. To assess educational differences, we dichotomized this variable into low/medium educational level (primary school education, preparatory vocational education, secondary school education, and vocational education) versus high educational level (higher vocational training/pre-university degree and university degree). The other covariates were assessed at the baseline of this study (Wave 3). Parents reported their height and weight, based on which parental BMI was calculated (as weight in kilograms divided by the square of height in meters). Child age was calculated based on the difference between test date and birth data of child as reported by parent. Finally, parents reported on their own gender and the gender of their child (0 = male; 1 = female).

2.3. Strategy of analyses

All analyses were performed in SPSS version 27.0. We have checked normality and distribution assumptions of our well-being and food parenting variables with a scatterplot, QQ-plot, and the Shapiro-Wilk test. The Shapiro-Wilk test showed some non-normal distributions for our food parenting constructs. However, most of the plots showed no extreme outliers and skewness and kurtosis were also within the normal range for most variables. For the depressive symptoms scores at baseline we detected 2 extreme outliers. Outliers were winsorized, after which scores for skewness were within the acceptable range between -2 and $+2$ (skewness = 1.68) (George & Mallery, 2019). For autonomy support, the plots showed extreme outliers (5 cases at baseline and 3 cases at follow-up). These outliers were winsorized, after which values of skewness and kurtosis were also within the normal range (baseline: -0.74 and -0.37 ; follow-up: -0.98 and 0.17).

To examine our first research question regarding differences in food parenting practices (and parental well-being) comparing the situation before and during COVID-19, we calculated paired-samples *t*-tests, repeated measures ANOVAs, and chi-square analyses. Paired-samples *t*-tests were the default, but in the case child age was significantly correlated with one of the food parenting constructs, we performed repeated measures ANOVAs controlling for age, instead of paired-samples *t*-tests. A chi-square test was performed to compare the dichotomized healthy structure food parenting practices before and during COVID-19. To examine our second research question with regard to associations between parental well-being and the various dimensions of food parenting, first, concurrent correlations were calculated between all variables (including covariates) at both time points. Pearson correlation coefficient was the default. However, in case of two dichotomous variables, Spearman correlation coefficient was used. Moreover, we conducted 8 (2 parental well-being measures * 4 food parenting continuous measures) linear regression analyses and 2 logistic regression analyses (2 parental well-being measures * 1 food parenting 'healthy structure' dichotomized measure) to estimate the prospective links between baseline parental well-being (i.e., stress or depressive symptoms) and follow-up food parenting variables (i.e., outcome variables). We tested moderation of the number of COVID-19 stressful life events and controlled for baseline food parenting, number of pre-COVID-19 life events, parental gender, educational level and BMI and child gender and child age (i.e., PROCESS Model 1). These analyses were first performed on complete data, using the Expectation-Maximization imputation technique in SPSS to impute missing values (i.e., ranging between 0.3% and 13.7%). Analyses were also performed on the subsample of participants with complete information. Moreover, we also performed the regression analyses without covariates in order to further test the robustness of potential interaction findings.

2.4. Deviation from pre-registration

As we performed several overlapping tests, we decided to correct for multiple testing. The pre-registered *p*-value of .05 was divided by 2 (2 overlapping parental well-being predictor, parental stress and depression), resulting in the use of a corrected *p*-value threshold of .025.

3. Results

3.1. Differences in parental well-being and food parenting during COVID-19

Table 1 shows some (small) differences in food parenting and parental well-being when comparing the situation before and during COVID-19. Replication of these analyses in data without imputed missing values showed equivalent findings. With regard to mental health, parents reported on average an increase in stress and depressive symptoms during COVID-19 compared to pre-COVID-19. In terms of food parenting, parents reported significantly less autonomy support and more coercive control during COVID-19 compared to pre-COVID-19, whereas no differences were found for snack structure and modeling. For the dichotomized healthy structure variable we found significant differences between groups ($\chi^2(1) = 40.13, p < .001$). Specifically, among parents providing a complete healthy structure before COVID-19 ($n = 194$), 11.9% were no longer providing such complete healthy structure during COVID-19, whereas among those parents not providing a complete healthy structure before COVID-19 ($n = 55$), 49.1% were providing a complete healthy structure during COVID-19. Please note that only parents who 'agreed', but not parents who 'slightly agreed', got a score of '1' on this dichotomized variable. As such, we suggest that these 'shifting' patterns, leading to the significant chi-square value, must be interpreted with caution. Moreover, the average percentage of parents offering a completely healthy structure also remained approximately the same (77.9% and 79.5% before and during COVID-19 respectively).

3.2. Correlations between parental well-being, food parenting, life events, and covariates

Table 2 presents the concurrent correlations between parental well-being and food parenting practices, as well as correlations with life events and covariates. Before COVID-19, parental stress and/or depressive symptoms were significantly negatively correlated with autonomy support and positively correlated with coercive control. These correlations were not significant during COVID-19. In contrast, during COVID-19, parental stress and depressive symptoms were significantly negatively correlated with the provision of a 'complete healthy structure'. No significant correlations, neither before nor during COVID-19, were found between parental well-being (i.e., parental stress or depressive symptoms) and food modeling or snack structure.

Parental stress or depressive symptoms before and during COVID-19 were significantly (positively) correlated with the number or presence of COVID-19 life events. Moreover, correlations with gender indicate that women experienced significantly more depressive symptoms and stress during COVID-19. Parental education level was negatively correlated with stress before COVID-19 and positively correlated with healthy structure during COVID-19 and autonomy support both before and during COVID-19. Finally, a higher parental BMI before COVID-19 was associated with the provision of less healthy food parenting practices (i.e., autonomy support before and during COVID-19, modeling and healthy structure before COVID-19). The same pattern of statistically significant correlations was observed in the subsample of complete cases.

Table 1
Differences in Parental Well-Being and Food Parenting Before and During COVID-19.

Variable	Before COVID-19 <i>M</i> ± <i>SD</i>	During COVID-19 <i>M</i> ± <i>SD</i>	Δ <i>M</i> ± <i>SD</i>	95% CI	<i>t</i> / <i>F</i> ^a	<i>p</i>	<i>d</i> ^b
Depressive symptoms	3.56 ± 3.65	4.52 ± 3.72	0.96 ± 3.69	0.53/1.39	<i>t</i> = 4.45	<.001	0.26
Stress	7.43 ± 2.28	7.97 ± 1.98	0.54 ± 2.25	0.28/0.80	<i>t</i> = 4.06	<.001	0.24
Autonomy Support	4.53 ± 0.53	4.42 ± 0.55	-0.11 ± 0.52	-0.17/-0.05	<i>t</i> = -3.73	<.001	-0.22
Coercive Control	2.17 ± 0.99	2.29 ± 0.98	0.12 ± 0.85	0.02/0.22	<i>t</i> = 2.42	.016	0.14
Snack Structure	3.70 ± 0.84	3.47 ± 0.85	-0.22 ± 0.05	-0.31/-0.13	<i>F</i> = 0.46	.497	-
Modeling	3.41 ± 1.11	3.41 ± 1.07	-0.003 ± 0.06	-0.13/0.12	<i>F</i> = 2.60	.108	-

Note: In case *p*-values were larger than .001, the exact *p*-values have been reported.

^a Repeated measures analyses, as we needed to control for age, as preregistered.

^b Cohen's *d* calculated for statistically significant variables.

Table 2
Correlation Coefficients Between Parental Well-Being, Food Parenting, Life Events, and Covariates Before and During COVID-19.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Depressive symptoms before COVID-19	1	.50	.67	.44	-.14	-.07	.08	.10	-.08	-.05	-.08	-.06	-.05	-.03	.14	.09	.11	-.13	-.04	-.00	.09
2. Depressive symptoms during COVID-19	<.001	1	.34	.54	-.08	-.10	.04	.06	.00	.07	-.03	-.18	-.06	-.08	.10	.18	.15	-.08	.08	.02	.01
3. Stress before COVID-19	<.001	<.001	1	.45	-.14	-.07	.15	.15	-.11	-.02	-.11	-.11	.01	-.03	.11	.09	.11	-.19	.05	-.02	.05
4. Stress during COVID-19	<.001	<.001	<.001	1	-.12	-.11	.11	.07	.02	.04	-.15	-.18	-.11	-.11	.18	.16	.20	-.13	.04	-.10	-.07
5. Autonomy Support before COVID-19	.015	.199	.021	.044	1	.54	-.03	-.01	.28	.26	.35	.14	.26	.19	-.01	-.02	.12	.22	-.17	-.05	-.03
6. Autonomy Support during COVID-19	.227	.086	.239	.055	<.001	1	-.01	.02	.32	.41	.27	.25	.28	.29	.00	-.05	.12	.15	-.17	-.10	-.02
7. Coercive Control before COVID-19	.160	.499	.009	.074	.595	.815	1	.62	.12	.13	-.01	-.10	.00	-.06	-.01	.05	.10	-.12	.09	.03	-.06
8. Coercive Control during COVID-19	.101	.297	.010	.221	.826	.744	<.001	1	-.00	.06	-.07	-.16	-.05	-.02	.02	-.05	.09	-.13	.09	.06	-.00
9. Modeling before COVID-19	.194	.966	.072	.790	<.001	<.001	.038	.948	1	.52	.06	.07	.27	.31	-.00	-.01	.04	.08	-.14	-.06	-.05
10. Modeling during COVID-19	.419	.263	.779	.475	<.001	<.001	.025	.296	<.001	1	.08	.02	.28	.32	-.08	.02	.11	.02	-.05	-.16	-.05
11. Healthy Structure before COVID-19	.195	.662	.058	.010	<.001	<.001	.899	.262	.350	.201	1	.40	.14	.06	.00	-.11	.04	.12	-.21	.10	-.12
12. Healthy Structure during COVID-19	.362	.005	.098	.004	.029	<.001	.127	.013	.296	.704	<.001	1	.08	.09	-.05	.00	-.05	.16	-.05	-.05	-.02
13. Snack Structure before COVID-19	.400	.285	.825	.061	<.001	<.001	.994	.385	<.001	<.001	.023	.191	1	.59	-.07	-.10	-.01	.08	-.09	-.09	-.01
14. Snack Structure during COVID-19	.668	.188	.647	.059	.002	<.001	.304	.751	<.001	<.001	.308	.171	<.001	1	-.08	-.07	.01	.06	-.05	-.14	.02
15. Life Events before COVID-19 (0 = no)	.020	.103	.072	.004	.934	.993	.908	.742	.958	.229	.965	.425	.285	.178	1	.18	-.08	.02	-.05	-.04	.08
16. Life Events during COVID-19	.127	.002	.119	.007	.790	.422	.369	.367	.858	.693	.067	.987	.092	.245	.003	1	.07	.01	.01	.01	.10
17. Parental gender (0 = male)	.061	.009	.064	<.001	.049	.046	.077	.150	.528	.061	.549	.473	.820	.891	.228	.258	1	-.23	-.07	-.04	-.06
18. Parental education (0 = low)	.034	.201	.001	.039	<.001	.010	.039	.029	.214	.695	.057	.013	.174	.297	.796	.894	<.001	1	-.13	-.04	.05
19. Parental BMI at baseline	.552	.202	.447	.539	.004	.003	.129	.125	.016	.440	<.001	.476	.114	.435	.469	.830	.213	.031	1	-.02	.05
20. Child age at baseline	.957	.790	.748	.099	.447	.108	.644	.348	.311	.008	.093	.401	.116	.017	.563	.932	.459	.496	.745	1	-.08
21. Child gender (0 = male)	.149	.817	.423	.240	.610	.741	.347	.941	.451	.402	.040	.801	.882	.773	.222	.089	.290	.440	.389	.207	1

Note: Gray highlighted cells = "during COVID-19" variables. Green table cells = positive significant correlation; Red table cells = negative significant correlation. Transparent table cells = non-significant correlation. Exact *p*-values have been added below the diagonal, with *p*-values below .001 denoted as <.001.

3.3. The development of food parenting over time explained by parental mental health and life events during COVID-19

Table 3 shows the results of the regression analyses examining longitudinal associations between pre-COVID-19 parental well-being (i.e., stress or depressive symptoms) and follow-up food parenting practices during COVID-19, and the moderation of life events during COVID-19. Baseline pre-COVID-19 stress or depressive symptoms was not significantly associated with any of the food parenting measures during COVID-19. All interactions involving life events were also not statistically significant. Child age showed a negative link with food modeling during COVID-19, after controlling for baseline food modeling and other covariates ($\beta = -0.14, p = .024$) in the model for parental stress). No other statistically significant results ($p < .025$) were detected.

4. Discussion

This longitudinal study filled several important gaps by examining differences in food parenting practices before and during the COVID-19 pandemic in a sample of parents of adolescents, while also examining potential effects of parental well-being in combination with COVID-19 stressful life events. In general, parents reported use of significantly

less autonomy support and more coercive control during COVID-19 as compared to before. However, parental mental well-being showed no statistically significant associations with (later) food parenting during COVID-19. Interactions between parental well-being and COVID-19 stressful life events were also not statistically significant. Findings will be discussed below in light of the original hypotheses.

We expected 'worsening patterns' towards less effective and more ineffective use of all types of food parenting practices during COVID-19. However, we only found evidence for a small decrease in the use of food autonomy support and an increase in the use of coercive control during COVID-19. In contrast, longitudinal research among parents of preschool-aged children have reported a worsening in all types of food parenting practices during COVID-19 (Loth et al., 2021). Of note, in line with our food autonomy-supportive findings, previous general parenting research (not related to food intake) has similarly shown that autonomy support has specifically decreased during COVID-19 among parents of adolescents (Bülow et al., 2021). These specific changes for autonomy support and, in our case, also coercive control may be explained by the target group (i.e., parents with adolescent children). As mentioned, adolescence is a time of growing independence, more autonomous decision making, and, as such, increased reciprocal influences of adolescents on their parents' behaviors, also with regard to (unhealthy) food

Table 3

Regressions Explaining Food Parenting at Follow-Up (During COVID-19) by Interactions Between Baseline Parental Well-Being (Stress or Depressive Symptoms) Before and Life Events During COVID-19.

Food parenting constructs at follow-up		Adjusted for baseline food parenting only ^a				Adjusted for baseline food parenting and covariates ^b			
		Beta ^a	SE ^a	p ^a	Adj R ²	Beta ^b	SE ^b	p ^b	Adj R ²
Autonomy support at follow-up	Baseline stress	.01	.05	.897	0.29	-.01	.06	.856	0.27
	COVID-19 life events	-.04	.05	.427		-.03	.06	.619	
	Interaction ^c	.04	.05	.345		.04	.05	.434	
Coercive control at follow-up	Baseline dep. symptoms ^d	.01	.05	.912	0.40	-.04	.06	.558	0.38
	COVID-19 life events	-.04	.05	.429		-.02	.06	.686	
	Interaction ^c	.07	.05	.182		.07	.06	.197	
Modeling at follow-up	Baseline stress	.06	.05	.167	0.40	.04	.05	.481	0.38
	COVID-19 life events	-.09	.05	.047		-.11	.05	.034	
	Interaction ^c	.02	.04	.792		.02	.05	.608	
Snack structure at follow-up	Baseline dep. symptoms ^d	.05	.05	.243	0.40	.02	.06	.743	0.38
	COVID-19 life events	-.09	.05	.049		-.11	.05	.036	
	Interaction ^c	-.01	.04	.773		-.01	.05	.894	
Healthy structure at follow-up	Baseline stress	.04	.05	.438	0.28	.02	.06	.729	0.29
	COVID-19 life events	.03	.05	.608		.05	.06	.374	
	Interaction ^c	-.07	.05	.166		-.10	.05	.054	
Healthy structure at follow-up	Baseline dep. symptoms ^d	-.01	.05	.913	0.28	-.02	.06	.759	0.29
	COVID-19 life events	.03	.05	.558		.05	.06	.388	
	Interaction ^c	-.07	.05	.135		-.10	.06	.077	
Healthy structure at follow-up	Baseline stress	-.03	.05	.511	0.35	-.04	.05	.521	0.35
	COVID-19 life events	-.01	.05	.894		-.01	.05	.821	
	Interaction ^c	-.09	.05	.055		-.09	.05	.075	
Healthy structure at follow-up	Baseline dep. symptoms ^d	.01	.05	.849	0.35	-.00	.06	.955	0.34
	COVID-19 life events	-.01	.05	.826		-.02	.05	.733	
	Interaction ^c	-.06	.05	.173		-.08	.05	.117	
Healthy structure at follow-up	Baseline stress	-.14	.16	.385	0.22	-.02	.18	.903	0.28
	COVID-19 life events	.19	.18	.308		.23	.19	.227	
	Interaction ^c	.03	.15	.818		.10	.16	.537	
Healthy structure at follow-up	Baseline dep. symptoms ^d	-.08	.16	.616	0.22	.06	.20	.779	0.28
	COVID-19 life events	.17	.18	.332		.25	.19	.193	
	Interaction ^c	.17	.16	.302		.20	.18	.282	

Note.
^a Model with baseline (before COVID-19) food parenting only.
^b Model with baseline (before COVID-19) variables and the additional covariates (i.e., parental gender, parental education, parental BMI, parental stressful life events before COVID-19, child gender, and child age).
^c Interaction between baseline parental stress before COVID-19 and COVID-19 life events or baseline depressive symptoms before COVID-19 and COVID-19 life events.
^d Baseline dep. symptoms = baseline depressive symptoms. Standardized variables were used to report standardized coefficients (i.e., beta's). Nagelkerke R² used for the logistic regression (for healthy structure only).

intake (Fitzgerald et al., 2010; McKeown & Nelson, 2018; Ziegler et al., 2021). The potential parental confrontation with unhealthy eating occasions during COVID-19 particularly, as well as other adolescent (autonomy-driven) behaviors in the home context, might have triggered some 'worsening' influences on coercive controlling (i.e., increase) and autonomy supportive (i.e., decrease) parenting practices specifically. The other food parenting constructs, including food modeling and snack structure, may play a larger role among parents of younger aged children, as parental direct control over food choices diminishes during adolescence (Fitzgerald et al., 2010). In support of this idea, we found that specifically food modeling and snack structure were negatively associated with child age. As such, these practices may not have changed during the COVID-19 pandemic in our study among parents of adolescents. Although the statistically significant effects were small in magnitude, the specific 'worsening patterns' for autonomy support and coercive control found in our study are considered important, given that autonomy support may play a role in building (food-specific) self-regulation, while coercive control may hinder the autonomous internalization of parental values with regard to food intake (Di Pasquale & Rivolta, 2018).

Despite these explainable 'worsening patterns' for specific food parenting characteristics during COVID-19 in our sample of parents with adolescent children, these changes did not appear not to be explained by parental well-being (i.e., stress or depressive symptoms). Specifically, our longitudinal findings did not provide any evidence for the link from earlier parental well-being before COVID-19 (also not in combination

with stressful life-events) to follow-up food parenting practices during COVID-19. Moreover, baseline concurrent correlations of parental well-being (i.e., stress or depressive symptoms) with autonomy support and coercive control were not significant during COVID-19. Although better parental well-being during COVID-19 was concurrently linked to the provision of a complete healthy structure, we suggest that these correlations might be explained by reversed causation, as we also found significant links between healthy structure before COVID-19 and the amount of stress experienced during COVID-19. As such, parental well-being does not seem to play an important role in determining food parenting among parents of mid-adolescents during COVID-19. Future longitudinal research examining younger age cohorts is needed to better understand links between parental well-being and food parenting.

Although this study had a couple of notable strengths, including the longitudinal design and relatively large sample of parents with adolescent children, we should also mention some limitations. Our sample consisted mostly of highly educated parents. There is a well-known link between lower education and worse mental health outcomes with persistent educational disparities in mental health during COVID-19 and financial stress likely contributing to such disparities (Jiang, Zilioli, Balzarini, Zoppolat, & Slatcher, 2021). As such, future research should also focus on the link between parental well-being and food parenting among more (financially) deprived populations. Moreover, BMI has problems as an indicator of body composition, particularly in the desirable BMI range (Meeuwse, Horgan, & Elia, 2010). Furthermore, we needed to dichotomize the 'healthy structure' food parenting

variable, which led to a less precise and informative measure of this construct. As such, outcomes on this variable must be interpreted with caution. Finally, our findings have been based on self-reported questionnaires. Participant reporting bias might thus have affected the results. For instance, parents experiencing worse mental health might also regard their food parenting as more negative or ineffective, as depression is characterized by both increased focus on and decreased disengagement from negative information (Gotlib & Joormann, 2010). Nevertheless, this would have increased the risk of inflated associations between parental well-being and food parenting, and we do mostly not find any evidence for such links. Future observational research or survey research using different reporters might further shed light on specific links found in this study.

To conclude, this longitudinal study adds to the existing literature by examining food parenting both before and during COVID-19. Moreover, it provides further insight into the specific link between parental well-being and food parenting among parents of adolescents, a target group that has been hardly examined so far. Our findings show a small decrease in autonomy support and an increase in coercive control during COVID-19 in general, suggesting that especially these food parenting practices worsen somewhat because of the COVID-19 situation among parents of adolescents. Overall, findings of this longitudinal study indicate that, although the COVID-19 situation may have had some negative effects on autonomy supportive and coercive controlling food parenting practices in general, parental well-being did not influence food parenting practices during COVID-19 among parents of adolescents.

Declaration of submission

The manuscript has not been published previously, has not been peer-reviewed previously, is not submitted elsewhere, and is not considered for publication elsewhere. All authors have approved the authorship order and the content of the manuscript.

Funding

This research was supported by ZonMw under Grant Number 10430032010009.

Ethics statement

As stated in the Methods of our Manuscript (lines 140–144), this study was conducted in accordance with the Declaration of Helsinki, and the study procedures were approved by the Ethics Committee Social Sciences of Radboud University (ECSW20170805-516). An active parental consent procedure was used, and adolescents were asked to provide consent themselves as well. More details are provided in a previous paper (van den Broek et al., 2020).

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.

Data availability

The SPSS output files are available through the OSF link in the manuscript. The data used for the current study are available upon request through the corresponding author (via data request form).

Acknowledgements

We would like to thank all the participating schools, adolescents, and families for their contribution to this research project. Moreover, we

would like to thank all the student assistants for their help during the data collection of this project.

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