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Review

Systematic Literature Review on Parental Perspectives of the Impact of COVID-19 Lockdown on Food-Related Behaviors

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Abstract: Home confinement during the COVID-19 pandemic has been accompanied by dramatic changes in household food dynamics that can significantly influence health. This systematic literature review presents parental perspectives of the impact of COVID-19 lockdown on food preparation and meal routines, as well as other food-related behaviors, capturing both favorable and unfavorable changes in the family food environment (FFE). Themes and trends are identified and associations with other lifestyle factors are assessed. In overall, families enjoyed more time together around food, including planning meals, cooking, and eating together. Eating more diverse foods and balanced meals was combined with overeating and increased snacking, as parents became more permissive towards food; however, food insecurity increased among families with the lowest income. Adoption of meal planning skills and online shopping behavior emerged alongside behaviors aimed at self-sufficiency, such as bulk purchasing and stockpiling. These results are an important first step in recognizing how this pandemic may be affecting the FFE, including low-income families. Future obesity prevention and treatment initiatives, but also ongoing efforts to address food management, parental feeding practices, and food insecurity, can account for these changes moving forward.

Keywords: Food; feeding style; eating trends; food interactions, food intake; food preparation; food management; food insecurity; meal planning; parent; child; family food environment; COVID-19; systematic review

1. Introduction

The outbreak of coronavirus disease (COVID-19) in late December 2019 in China, which later developed into the long-enduring pandemic, resulted in unprecedented changes to civil and social activity on a global scale, causing not only a health crisis, but also a series of social, economic, and food security issues (Farrell et al. 2020). To contain the COVID-19 outbreak, government response around the world was characterized by strict lockdowns or curfews, reliance on quarantine, and adherence to social distancing. A series of large-scale social distancing measures, which aimed at minimizing physical contact between individuals or groups of individuals, included schools switching to distance learning, work from home, keeping at least one meter from each other, the 2 + 2 rule (allowing meetings of two people from two different households out-of-doors), places of entertainment being closed, cancelation of public events, and closing international borders and airports, to name a few (Sun et al. 2022). The lockdown induction changed routine activities around the globe, such as those relating to daily shopping or within the transportation sector; as a result, the deficit in the retail system for a list of goods in the first wave of Covid-19 took place (Rossolov, Aloshynskyi, and Lobashov 2022) alongside consumers making the rapid shift to online services (Sharma and Jhamb 2020). Many other challenges and changes in the daily life followed, including all aspects of food-related decisions and behaviors.

Quarantine and social isolation are effective measures to control transmission of very infectious diseases, such as COVID-19 or the influenza pandemic of 1918, but they come

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with many caveats, including those affecting food-related aspects (Yen-Hao Chu et al. 2020). In addition to causing a series of social, psychological, and economic challenges (Yen-Hao Chu et al. 2020), social distancing may encourage consumers to favor ultra-processed foods (UPFs) due to their longer shelf life (Ammar et al. 2020; Bonaccio et al. 2021); as a result, stockpiling shelf-stable products was observed during the lockdown alongside reduction in the consumption of fresh foods (L. di Renzo et al. 2020). Increased intake of UPFs, which are defined as 'formulations of ingredients, mostly of exclusive industrial use, that result from a series of industrial processes (hence "ultra-processed"), many requiring sophisticated equipment and technology' (Monteiro et al. 2019), has negative consequences for long-term health effects at population level. Additionally, social isolation limits access to fresh food, mainly due to difficulties in transportation, distribution, and delivery (Tan, He, and MacGregor 2020).

Quarantine and social isolation can also encourage unhealthy eating through inducing emotional disturbance, boredom, stress, and anxiety (Muscogiuri et al. 2020; Naja and Hamadeh 2020; Macht 2008) – emotions that have been long known to facilitate emotional eating and other eating disorders. The impact of the pandemic and containment measures also led to a severe contraction in economic activity and resulting loss of disposable income, having devastating impact on poverty levels and inequality; as a result, 'the proportion of people who could not afford even half the cost of a healthy diet increased from 43% pre-COVID-19 (2020) to 50%' during the lockdown (Laborde et al. 2021). On the other hand, the pandemic has the potential to encourage positive changes in eating behavior, such as spending more time with family around food or eating together more home-cooked meals as opposed to eating out; additionally, people may also engage in health-seeking behaviors, including healthy eating, to seek protection from COVID-19 (Lau et al. 2005). Interestingly, one study shown that changes due to the pandemic were in line with pre-pandemic goals, such as favoring more local production, choosing unpacked or recyclable/biodegradable packed foods, or paying attention to one's weigh, therefore the pandemic may have been a catalyst for behavioral change (Grunert et al. 2021).

Nutrition systems are complex and interdependent structures with many levels of dietary influence. For example, ecological framework by Story and colleagues (Story et al. 2008) depicts multilevel, interacting influences on what people eat, such as retail food sources, economic and pricing issues, and food marketing and media effects (Story et al. 2008). A conceptual framework of food systems that has been proposed for children and adolescents (the 'Innocenti Framework') identifies such universally attributable determinants of diet as food supply chains, external food environments, personal food environments, and the behaviors of caregivers, children and adolescents (Raza et al. 2020); in addition, factors specific to children and adolescents are also identified and include the influence of schools and intra-household dynamics (Raza et al. 2020). Retail food environments (RFEs) set the context within which people acquire food by providing opportunities and constraints that influence food buying decisions (Food and Agriculture Organisation of the United Nations – FAO 2017). Dynamics and interactions between RFEs, individuals and households, and their larger contexts can produce a host of population outcomes, including dietary intake and health (Winkler et al. 2020). Lack of access to supermarkets that usually provide healthy food options combined with excessive access to fast-food restaurants in the neighborhood is thought to encourage intake of unhealthful food (Jia et al. 2021). Access to food may be a barrier for individuals living in "food deserts" (FDs), which are areas with limited healthy food accessibility as given by a certain distance threshold for walking; in particular, individuals with no access to car or with impaired mobility may face difficulty in accessing food.

COVID-19 has impacted ways people would usually access grocery shops through such social consequences of mass quarantine as trading hours restrictions or community-wide travel restrictions. The latter is particularly relevant when considering food accessibility because for many, especially those economically disadvantaged, public transport is a primary or only means of transport (de Vos 2020). During the COVID-19 pandemic, the

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use of public transport has been suspended or limited - by either restrictions or voluntary measures - (Sabat et al. 2020) as being one of the sources of virus transmission (K. Y. Wang 2014). Those with the least resources were put at a disadvantage (Almlöf et al. 2021), such as people living in FDs, but have continued travelling with public transport to the greatest extent (Almlöf et al. 2021), resulting in both further spread of the virus and in inequality of risk (Almlöf et al. 2021; de Vos 2020).

In addition to external food environments, the importance of the family food environment (FFE) in establishing healthy eating habits during childhood/adolescence is well established and includes considerations for both home food availability and parental modelling of dietary behaviors (Yee, Lwin, and Ho 2017). The FFE is a complex domain comprised of both parents' and children's individual characteristics and behaviors, the former including nutrition knowledge, parenting styles and feeding practices, role modelling, and food availability and accessibility (Variyam et al. 1999). Parental food habits and feeding strategies are the most dominant determinants of a child's eating behaviors and food choices (Scaglioni et al. 2018); for example, parental consumption of fruit and vegetables (Boutelle et al. 2003) or sugar-sweetened drinks (Campbell et al. 2007) has been found to predict children preference for the same type of food. Food exposure (Cooke 2007), eating with other family members as opposed to eating in front of the TV (Boutelle et al. 2003), and regular family meals (even with the TV on) (Feldman et al. 2007) have also a positive influence on diet quality of children. Additionally, higher maternal nutrition knowledge has also been associated with healthier diets and lower body weight in children (Variyam et al. 1999). Longitudinal evidence also suggests that changes in the FFE in terms of parents' knowledge and attitude, as given by increase in nutrition knowledge, perceived responsibility and restriction, are associated with positive dietary change in children (Hendrie et al. 2013).

Recently COVID-19 pandemic directly impacted household time activities, such as work, eating food away from home, grocery shopping, and childcare (Scharadin, Yu, and Jaenicke 2021), which in turn have influenced diet quality and food waste, the latter which decreased (Scharadin, Yu, and Jaenicke 2021). Results for the former are mixed, as for example increased time spent in preparing food at home has been related to higher diet quality (Scharadin, Yu, and Jaenicke 2021), however, one systematic review of longitudinal studies on eating behavior changes during the COVID-19 pandemic found the pandemic has led to increased alcohol consumption, snack frequency, and a preference for sweets and ultra-processed food rather than fruits, vegetables, and fresh food (González-Monroy et al. 2021).

To support nutrition and food security during the COVID-19 pandemic, Naja and Hamadeh (2020) proposed a multi-level framework, using the various levels of the ecological health model: individual, community, national and global. At the individual level, food utilization, changes in eating patterns, and physical inactivity have been identified as areas for intervention. Community level has been characterized by challenges relating to food accessibility, social support, food availability, equity among vulnerable groups, and hoarding. At the national level, issues of food insecurity, food assistance programs, and healthy food basket have been highlighted, among others. Finally, at the global level, it is essential to ensure smooth flow of global trade to secure food supply across the globe (Naja and Hamadeh 2020).

The focus of this review is on individual- and community-level challenges as experienced in the family setting during the COVID-19 pandemic. Specifically, its aim is to synthesize the available evidence on parental perspectives of the impact of COVID-19 lockdown on the FFE and food-related activities, capturing both favorable and unfavorable changes in food preparation and meal routines, as well as other relevant behaviors revolving around food, such as food shopping, meal planning, and eating habits. Other reviews in the food domain have mainly been concerned with either eating behavior changes in general population (González-Monroy et al. 2021; Bennett et al. 2021), including low- and middle-income countries (Picchioni, Goulao, and Roberfroid 2021) and adherence to the

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Mediterranean diet (della Valle et al. 2021), obesity risk factors (Daniels et al. 2022), the relationship between dietary intakes and immunity (Mirzay-Razaz, Hassanghomi, and Ajami 2022), effects on diet and physical activity in older adults (Larson, Bader-Larsen, and Magkos 2021), and parental perceptions of the food environment and their influence on food decisions among low-income families (Ravikumar et al. 2022). According to author's best knowledge, this is the first systematic review that aims to comprehensively study the evidence relating to general parental food perspectives during the pandemic, including low-income parents. Results can inform policy as well as provide insight about interventions that could encourage long-term adoption of improved food purchasing/management and feeding practices in the family setting.

2. Materials and Methods

All articles that examined parental/caregiver perspectives on the FFE/food-related activities during the COVID-19 pandemic, which included meal preparation and other family interactions around food (e.g., conversations, gardening, cooking, and eating together), were considered eligible for this review**.** A literature search of the PubMed, Scorpus and Web of Science databases was conducted up to 30 June 2022 using the following terms: '(Eating OR feeding OR eating behavio* OR eating habits OR eating trends OR food OR food choices OR food consumption OR diet* OR dietary trends OR dietary patterns) AND (COVID-19 OR lockdown OR pandemic) AND (child* OR adolescen* OR parent* OR caregiver OR family) AND (cook* OR food preparation OR meal preparation OR food shopping OR meal planning)'. References of eligible studies and relevant reviews were also searched, in a snowballing technique.

Results were screened for eligibility based on title, abstract, and finally full text. The inclusion criteria of this literature search included the following:

1. Limit to papers published up to 30 June 2022 (including pre-prints;
2. Studies that investigated the association of COVID-19 lockdown and parental/caregiver perspectives of family interactions around food, including food preparation and meal routines;
3. The age range including children and adolescents, along with their parents/caregivers;
4. Changes in family interactions around food could be reported by children/adolescents or by parents/caregivers;
5. Only research articles in English.

There was no demographic restriction other than age, and all study designs were considered eligible. Literature, systematic, or narrative studies reviewing previous research were excluded using automatic search limits in databases; additionally, studies that considered chosen aspect(s) of parental perspectives on the FFE (e.g., dietary patterns) in isolation from meal preparation and family interactions around food were also excluded from the synthesis.

For final full-text studies included in the review, the following characteristics were extracted: first author, year, title, journal, objective, type of study, method, participant number, age, location, findings, and conclusion. These results are shown in Table A1 in Appendix. Additionally, rapid qualitative analysis methods were used to identify themes around changes in parental perspectives on the FFE/food-related activities, and data from each paper for the relevant themes were gathered and grouped together for analysis. Results were summarized via a narrative review; a quantitative synthesis was not attempted due to the heterogeneity of the samples and methodology between studies.

The study was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al. 2009).

3. Results

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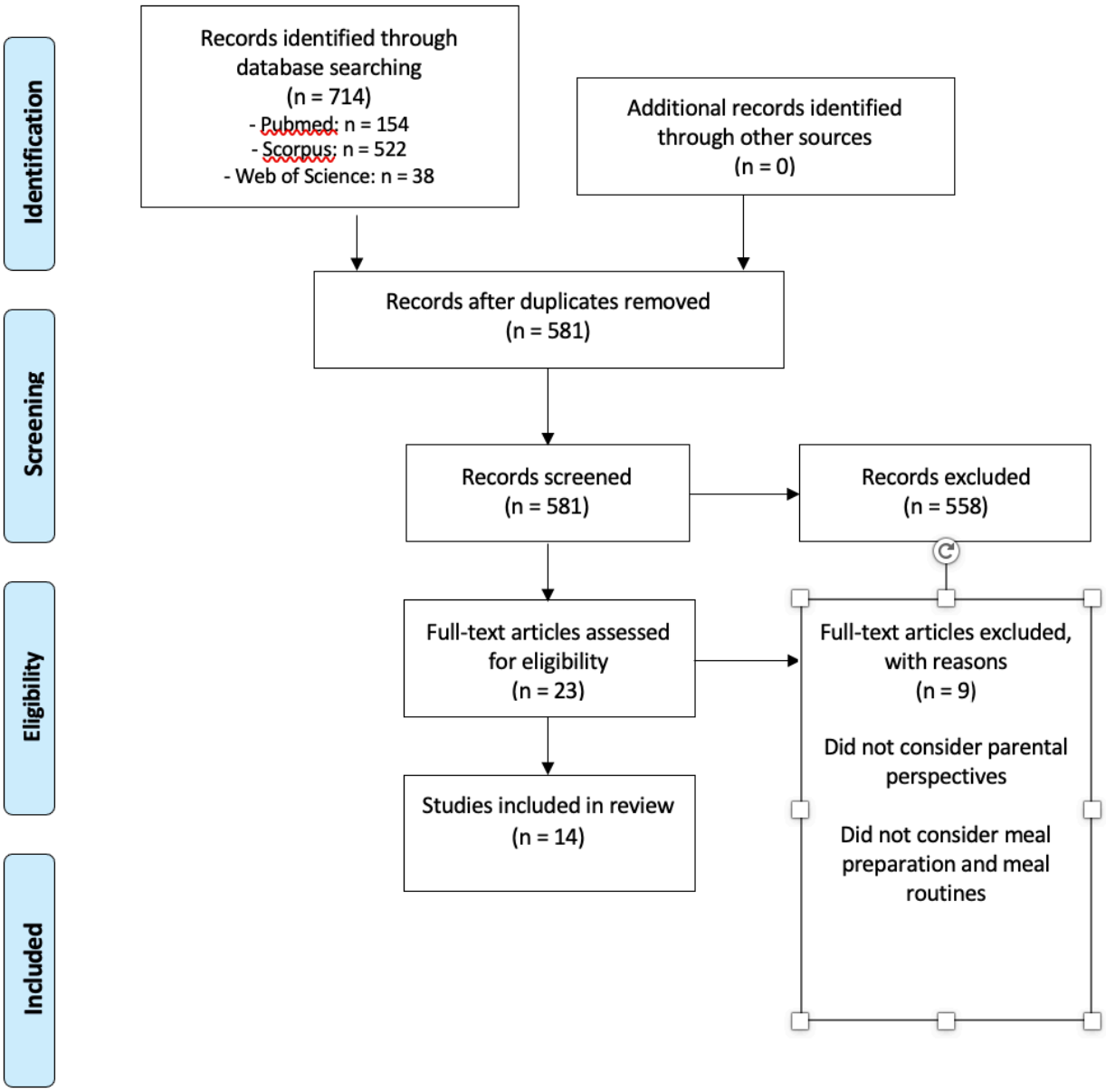
Out of a total of 581 papers initially identified (after removing duplicates), 14 full papers were included in the synthesis (see Figure 1). Included studies were from different countries, thereof four European and four American; other locations included Canada, Mumbai in India, Gaza Strip in Palestine, Australia, New Zeeland, and China. Eight studies used quantitative surveys, four studies used qualitative interviews, and two studies used both quantitative and qualitative data (surveys with closed-ended questions analyzed via descriptive statistics and open-ended responses analyzed thematically). These results are presented in Table A1 in Appendix.

Figure 1. PRISMA 2009 flow diagram displaying the selection process of the 14 final papers.



The results suggest that nutrition-related changes occurred during the lockdown in both unfavorable and favorable directions. Table 1 summarizes main results regarding the research themes: food purchasing and planning, meal preparation and routines, and eating and feeding behaviors. Subsequently, thematic synthesis yielded the following three themes of changes: 'changes in meal planning and shopping behaviors,' 'changes in food preparation behaviors and meal routines' and 'changes in feeding and eating behaviors.'

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Each theme was analyzed from the parental perspective and reflects a stage of the decision-making process around food that directly affects children's eating practices. In addition, considerations about weight/obesity and uneven burden of COVID-19 on families are also addressed as being important areas of interest found in the studies (n=6). The following discussion is separated into four parts to support both the research themes and additional considerations.

Table 1. Summary of results by research themes.

Study	Food purchasing and planning	Meal preparation/routines	Eating and feeding
Benson et al. (2022)	Not addressed	Parents' time spent cooking and inclusion of children in everyday cooking activities increased	Not addressed
Carroll et al. (2020)	Some concerns about grocery shopping	Spending more time cooking, making more meals from scratch, eating more meals with children, and involving children in meal preparation more often	Eating more food, including snack foods, and eating fewer foods from fast food and/or take out
Ferrante et al. (2021)	Going to the grocery store less often, increases in use of online grocery shopping	Eating home-cooked meals more often	When eating out, parents were involved in deciding what their child eat, including nutrition concerns
Menon et al. (2022)	Adoption of meal planning skills, increase in online food shopping, bulk buying, shortage of food items	Increased household cooking, involvement of children and male members in food-related activities, experimentation in the kitchen, reduced consumption of outside home food	Increase in overall food intake, including variety of home-cooked meals and snacking. Health and immunity, family members' preferences and taste, and food availability determined food choices
Philippe et al. (2021)	Parents more frequently bought foods their child liked, but also more healthy and sustainable foods	Increased household cooking, more time cooking with their child(ren)	Child appetite and emotional overeating increased; parents became more permissive
Philippe et al. (2022)	More fresh, seasonal, and local foods, paying more attention to the nutritional value of foods and meals, families have more time to plan meals and moments together.	Cooking with the child was a pleasurable activity and the occasion to educate about food, to pass on certain cooking skills and values around food, and to taste new flavors	Spending more time together around food (home-made dishes, new recipes, cooking and eating together with the family at a calm pace). Diversity of foods and balanced meals, but parents were also concerned about increased intake of palatable foods and weight gain
Spyreli (2021)	Stockpiling shelf stable foods due to grocery shortages and purchasing more SDs and snacks	Making healthier choices because of not being "on the go" and cooking more meals at home, as opposed to eating out	Excess consumption of SDs and snacks among children; skipping breakfast when attending school virtually; parents removing prior restrictions on SDs and allowing more autonomy
Nanayakkara (2022)	Not addressed	Cooking, menu planning, eating, conversations around food, and gardening. Parents enjoyed preparing meals with their children	Eating hot and home-cooked food and more elaborate meals at lunch
Radwan et al. (2021)	Parents either sought their children's opinions about what they would like to eat for the meals or got their children involved in menu planning	Parents interacting more with their children about food, including cooking, conversations, menu planning, gardening, and eating	Eating more home-cooked or hot lunches. Lunch quality improved, including increased variety, more elaborate and complex meals, and healthier meals. Parents involved in controlling the food or snack intake of their children whose appetite increased
Jansen et al. (2021)	Not addressed	More structure and positive interactions around food, including eating with or engaging with child around mealtimes. School-aged children were more likely to help prepare foods at mealtimes	Regular mealtimes and irregular snack times; more non-nutritive use of food and snacks (e.g., emotional and instrumental feeding); greater child intake frequency of sweet and savory snacks, with some evidence for mediation by snack parenting practices
	More prudent use of food with less wastage; food prices held steady in		

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	U.S. but not in China; most foods were available, but many had limited options (U.S.); in China, all food types were well "stocked", with some choice limitations	More time spend on food preparation and less eating out or ordering in	Overeating and increased eating frequency. Overall, no change in weight, but people reporting weight gains outnumbered those reporting weight loss
Adams et al. (2020)	Not addressed	Decrease in consumption of take-out/fast-food/already prepared meals and an increase in home-cooked meals	Restrictive feeding practices, pressure to eat, and monitoring; some parents cut or skipped meals; increase in non-perishable processed foods combined with concerns about child overweight; greater changes in parents' concern about child overweight and pressure to eat observed for families experiencing food insecurity
Farello et al. (2022)	Amount of food in the home increased because of "panic shopping". Desire for families to stock up on foods and minimize social exposure	Increase in home-cooked meals since parents spent more time at home	Increase in the consumption of high-calorie snack foods. The total amount of food in homes increased 50%. More parents reported obesity in their children after lockdown

3.1. Changes in meal planning and food shopping behaviours

General trends in meal planning and grocery shopping behaviors during the pandemic were adoption of meal planning skills (Menon et al. 2022; Radwan, Radwan, and Radwan 2021; Spyreli et al. 2021), shopping less often (Ferrante et al. 2021; Spyreli et al. 2021), observing prices going up (Spyreli et al. 2021), shortage of food items (Menon et al. 2022; Sylvetsky et al. 2022), need to provide a nutritious diet for health (Spyreli et al. 2021; Philippe et al. 2021; Philippe, Issanchou, and Monnery-Patris 2022), and shift towards home food deliveries (Ferrante et al. 2021; Menon et al. 2022; Spyreli et al. 2021). Four studies did not report on this aspect of food-related parental perspectives (Benson et al. 2022; Nanayakkara et al. 2022; Jansen et al. 2021; Adams et al. 2020).

Negative changes included stockpiling shelf stable foods due to grocery shortages (Sylvetsky et al. 2022) and to minimise social exposure (Farello et al. 2022); this included bulk (Menon et al. 2022) and panic buying (Farello et al. 2022), and purchasing more SDs and snacks due to the whole family being at home (Sylvetsky et al. 2022). Others were critical of bulk buying (Spyreli et al. 2021) or appreciated choices of more fresh, seasonal, and local foods (Philippe, Issanchou, and Monnery-Patris 2022), the latter which was often related to an increased choice of fruits and vegetables (Philippe, Issanchou, and Monnery-Patris 2022). Food planning improved (Menon et al. 2022) in terms of providing an all-inclusive balanced diet to keep family members strong and healthy (Spyreli et al. 2021); positive food attitudes in the more prudent use of food with less wastage were also observed (Dou et al. 2021). Parents more frequently bought foods their child liked (Philippe et al. 2021), sought their children's opinions about what they would like to eat for the meals (Radwan, Radwan, and Radwan 2021), or got their children involved in menu planning (Radwan, Radwan, and Radwan 2021; Nanayakkara et al. 2022). Parents also bought more healthy and sustainable foods (Philippe et al. 2021), as the lockdown gave them the opportunity to pay more attention to the nutritional value of foods and meals, and stimulated them to provide a diversity of foods and balanced meals (Philippe, Issanchou, and Monnery-Patris 2022). One study reported some concerns about frequency of grocery shopping as parents would like to shop less often but fresh produce may not last that long (Carroll et al. 2020). Food-related support, such as support offered by friends, food donations and school meal assistance, was critical for economically disadvantaged families, who also reported increased importance of food offers during lockdown, difficulty in finding delivery slots and incomplete food deliveries (Spyreli et al. 2021).

3.2. Changes in food preparation behaviors and meal routines

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Majority of parents reported that their family meal routines had changed for the better since COVID-19; favorable changes included eating home-cooked meals as opposed to eating out, eating more meals with children, and involving children in meal preparation. These positive trends were reported in all the studies and no negative changes were observed. Moreover, parents made healthier choices as a result of not being "on the go" (Sylvetsky et al. 2022), including making more meals from scratch (Carroll et al. 2020) and experimenting in the kitchen (Menon et al. 2022; Philippe, Issanchou, and Monnery-Patris 2022). Cooking with the child was a pleasurable activity (Nanayakkara et al. 2022; Philippe, Issanchou, and Monnery-Patris 2022) and the occasion to educate about food, to pass on certain cooking skills and values around food, and to taste new flavors (Philippe, Issanchou, and Monnery-Patris 2022); additionally, as part of meal preparation routine, parents also involved their children in gardening together (Nanayakkara et al. 2022; Radwan, Radwan, and Radwan 2021). One study reported that cooking skills confidence was associated with a higher frequency of including children in cooking activities, and that a higher intake of vegetables by parents was predictive of more frequent including of children in cooking activities (Benson et al. 2022). Others found that being a female parent predicted a higher/lower frequency of the child consuming home-made meals/food at restaurants (Ferrante et al. 2021).

3.3. Changes in feeding and eating behaviors

The impacts of COVID-19 on feeding behaviors in parents and subsequent eating behaviors in their children have been varied. Many positive changes in feeding and eating practices were observed during the lockdown, including increased consumption of hot and home-cooked lunches (Nanayakkara et al. 2022; Radwan, Radwan, and Radwan 2021), and greater concern for health and immunity starting to impact food choices (Menon et al. 2022); consequently, lunch quality also improved, including increased variety, more elaborate and complex meals, and healthier meals (Nanayakkara et al. 2022; Radwan, Radwan, and Radwan 2021). Moreover, eating at a calm pace had positive consequences for the meal atmosphere at home and on children's eating behaviors (Philippe, Issanchou, and Monnery-Patris 2022), and being home together made some parents more aware of their children's SD consumption and/or help them to control it (Sylvetsky et al. 2022). Some parents also described their children had more interest in and accepted certain foods more easily when they had helped to prepare them (Philippe, Issanchou, and Monnery-Patris 2022). On the other hand, changes in children's daily routines during the COVID-19 pandemic had negative impacts on their eating behavior, such as overeating and eating frequency (Dou et al. 2021; Carroll et al. 2020; Menon et al. 2022; Philippe et al. 2021), increased intake of sugary drinks (SDs) (Sylvetsky et al. 2022) and snacks (Sylvetsky et al. 2022; Jansen et al. 2021; Farello et al. 2022; Philippe, Issanchou, and Monnery-Patris 2022), and emotional eating (Spyreli et al. 2021; Philippe et al. 2021); one study also reported that children were skipping breakfast when attending school virtually (Sylvetsky et al. 2022). Moreover, these negative changes in nutrition were accompanied by more flexible and lenient parenting style, which further facilitated unhealthy eating in children (Sylvetsky et al. 2022; Jansen et al. 2021; Spyreli et al. 2021; Philippe et al. 2021). One study did not report on this aspect of food-related parental perspectives (Benson et al. 2022).

Excess consumption of SDs and snacks among children was attributed to having unrestricted access to SDs and snacks, the child experiencing boredom, and a lack of scheduled or structured eating times (Sylvetsky et al. 2022). Parents were more likely to eat with their younger children, providing more structure around meals and restricting snacks, however, younger children were also more often subjected to instrumental feeding and emotion-based snack feeding by their parents (Jansen et al. 2021). Others argue that the majority of children had regular mealtimes but irregular snack times (Jansen et al. 2021), and that parental stress may be further responsible for non-nutritive use of food and snacks (Jansen et al. 2021), resulting in emotional and instrumental feeding

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(Philippe et al. 2021; Jansen et al. 2021). The pandemic also altered parents' oversight of children's SD and snack consumption, such that parents became more lenient (Spyreli et al. 2021) and permissive (Philippe et al. 2021), allowing their children more autonomy in making their own decisions about food (Philippe et al. 2021; Sylvetsky et al. 2022) and giving into children's food requests (Spyreli et al. 2021). In one study parents described removing prior restrictions on SDs, and in some cases, providing their children with SDs as a means of helping them cope with disturbances to daily life caused by the pandemic (Sylvetsky et al. 2022). On the other hand, not all parents showed this amount of tolerance with food and were involved in controlling the food or snack intake of their children (Radwan, Radwan, and Radwan 2021; Jansen et al. 2021; Sylvetsky et al. 2022).

3.4. Additional considerations about weight and uneven burden of COVID-19 on families

Five studies included considerations for weight and/or obesity (Dou et al. 2021; Adams et al. 2020; Philippe, Issanchou, and Monnery-Patris 2022; Jansen et al. 2021; Farello et al. 2022), and one study examined the impact of COVID-19 on food decisions of poor families (Spyreli et al. 2021). Overall, the total amount of food in the home increased (Adams et al. 2020; Farello et al. 2022) and people reporting weight gains outnumbered those reporting weight loss (Dou et al. 2021). Others argue that more parents reported obesity in their children after lockdown (Farello et al. 2022), or that they had some concerns about their children's weight (Adams et al. 2020; Philippe, Issanchou, and Monnery-Patris 2022). Distributions for changes in the amount of total food, high-calorie snack foods, desserts/sweets, fresh foods, and non-perishable foods in the home differed by food security status (Adams et al. 2020); also, greater changes in parents' concern about child overweight and pressure to eat were observed for families experiencing food insecurity, compared with food-secure families (Adams et al. 2020). One study also found that for low-income families, family's food needs had increased and infrequent shopping trips and reliance on supermarket home deliveries compromised home food availability in fresh food products (Spyreli et al. 2021); consequently, food-related support was critical, especially among single-parent families, who may also have had more challenges in adopting to a healthy diet during the COVID-19 lockdown/s compared to parents living with partner (Spyreli et al. 2021).

4. Discussion

This systematic review provides summaries of peer-reviewed published evidence on parental perspectives of the impact of COVID-19 lockdown on FFE, focusing on food preparation and meal routines; additionally, other aspects of food-related behaviors in the family setting are also addressed, including meal planning and grocery shopping, and feeding and eating practices. Overall, parents had many enjoyable interactions with their children about food during the lockdown, which seemed to have a positive impact on cooking (e.g., cooking home-made foods, increased intention to cook from raw ingredients, children becoming more involved in the meal preparation) and food planning (ensuring healthy eating, less trips to the shop, more prudent use of food and less wastage). Almost all of the included studies showed frequent consumption of well-balanced home-made meals, but also overeating and increased unhealthy snacking reinforced by more flexible and lenient parenting style. New trends in grocery shopping, weight concerns and uneven burden of COVID-19 on families were also reported. The follow up discussion addresses these issues in more detail using headings chosen for the purpose of best illustrating identified trends.

3.1. More time allows family to enjoy food and moments together but also leads to boredom

Time was cited as a factor that gave families the opportunity to plan meals and moments together (Dou et al. 2021; Philippe, Issanchou, and Monnery-Patris 2022), to prepare

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diverse and well-balanced meals (Philippe, Issanchou, and Monnery-Patris 2022; Sylvetsky et al. 2022), and to eat at a calm pace (Philippe, Issanchou, and Monnery-Patris 2022), the latter which had positive consequences for the meal atmosphere at home and on children's eating behaviors (Philippe, Issanchou, and Monnery-Patris 2022). On the other hand, increases in food responsiveness and emotional overeating were significantly correlated with an increase in child boredom at home (Philippe et al. 2021; Sylvetsky et al. 2022).

Family interactions and engagement are crucial for the family to eat healthily, as eating practices are intricately tied to family life and people tend to eat healthier when eating together with their family (Schaefbauer et al. 2015). Specifically, family awareness has been found to help plan meals and facilitate social comparison (Schaefbauer et al. 2015); this includes snacking awareness prompting caregivers prepare snacks ahead of time for their children and purchase healthier foods for the home (Schaefbauer et al. 2015). Before the lockdown, time was an important barrier for most parents, especially those working full time (Fernandez et al. 2019). Indeed, time can be thought of as a health resource, as for example, lack of time is the main reason people give for not taking exercise or eating healthy food (Strazdins et al. 2011); time pressure is also negatively and consistently associated with mental health over time (Hewitt et al. 2022). Moreover, the evidence suggests that time pressures contribute to socially patterned health inequalities among people caring for others (Strazdins et al. 2011); for example, alone mothers who are both time and income deprived may face compounding barriers to good diet and health (Strazdins et al. 2011). To face time pressures, parents often resort to meal simplification or taking out, losing sight of what is nutritionally beneficial (Jabs and Devine 2006); in order to balance healthy meals with time constrains, meal planning (Virudachalam et al. 2016) and time management (Pelletier and Laska 2012) have been recommended as suitable strategies. On the one hand, strategies to manage time scarcity are needed to further promote and facilitate family engagement around food after the lockdown, including home-based food preparation; on the other hand, social policies and planning and health interventions should continue involving time dimension to minimize time–income–space trade-offs faced by individuals (Strazdins et al. 2011).

On the other hand, given the recent lockdown, a new phenomenon of time abundance appears to be as damaging to healthy eating as time pressures, as children who are bored at home resort to emotional eating (EE) (Philippe et al. 2021). Individuals with EE use eating to reduce the intensity of negative emotions (KAPLAN and KAPLAN 1957); this provides instant gratification (Macht 2008) but is a poor coping strategy leading to more eating (Jalo et al. 2019). It is also possible that difficulties in emotion regulation may be one possible mechanism underlying EE (van Strien 2018). Since eating in response to negative emotions involves consumption of palatable foods to lift the mood (Macht 2008), EE may predict weight gain in adults (Koenders and van Strien 2011). Moreover, the clustering of health behaviors in children (Fernández-Alvira et al. 2013; Leech, McNaughton, and Timperio 2014) raises the question of whether EE is also related to physical activity (PA), sedentary behavior (SB), and/or sleep duration (Jalo et al. 2019). Previous results suggest that boredom is an important construct that should be considered a separate dimension of emotional eating (Koball et al. 2012). Moreover, short-term effects of the COVID-19 pandemic on PA and SB in children have been observed, which may become permanently entrenched if proper measures are not taken into account (Dunton, Do, and Wang 2020). Evidence shows that positive family environments could help children cope with unexpected changes in their everyday lives caused by the lockdown, however, the emerging weariness and boredom reported by some children in the second wave of lockdown strained family relationships (Kutsar and Kurvet-Käosaar 2021). Moving forward, in addition to promoting PA and reducing SB in children, programmatic and policy strategies should focus on time management skills, including educating parents and children on how to manage free time.

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3.2. People were more alerted to the relevance of nutrition and immunity

Some parents mentioned that the lockdown gave them the opportunity to pay more attention to the nutritional value of foods and meals (Philippe, Issanchou, and Monnery-Patris 2022), and it also stimulated them to provide a diversity of foods and balanced meals (Philippe, Issanchou, and Monnery-Patris 2022). For some fruit and vegetables became an important component of a healthy diet, and thus always featured in food shopping lists (Carroll et al. 2020), as opposed to basing food choice around food preferences and taste. Others wanted to buy fresh produce but worried about shelf life as they would prefer to shop less frequent (Carroll et al. 2020). This desire to eat more healthily during the pandemic was stimulated by either altered perceptions of health and immunity (Menon et al. 2022), or more choices of fresh, seasonal, and local foods on the market (Philippe, Issanchou, and Monnery-Patris 2022).

Experiences from previous outbreaks have shown that as an epidemic evolves people become more concerns about health and immunity (Lau et al. 2005). Most of the nutrition and dietary recommendations to combat viral infections, including COVID-19, revolve around maintaining a balanced diet (Naja and Hamadeh 2020), as existing evidence highlights that nutrients play an essential role in immune cell triggering, interaction, differentiation, or functional expression (Gleeson, Nieman, and Pedersen 2004; Wypych, Marsland, and Ubags 2017; Valdés-Ramos et al. 2010), thus having a profound effect on people's immune system and disease susceptibility. Research conducted during the COVID-19 outbreak alerted people to the importance of nutrition in protecting people's health in times of pandemic (Lamy et al. 2022), reporting the link between the levels of various nutrients and the severity of symptoms in COVID-19 (Martineau and Forouhi 2020; Jain et al. 2020; Carr and Rowe 2020), or relating diet-related ill-health (e.g., obesity) to a worse prognosis for the disease (Tamara and Tahapary 2020). Additional efforts are needed to maintain this level of public focus on diet-related health and immunity after the lockdown; in addition, educating about preserving the shelf life of fresh produce could prepare the public for better managing the food in future outbreaks.

3.3. Frequent consumption of homemade meals, but also increased unhealthy snacking

Most parents observed an increase in the overall food intake of their children during the remote learning period (Nanayakkara et al. 2022), who also ate more home-cooked and hot meals (Nanayakkara et al. 2022; Radwan, Radwan, and Radwan 2021); additionally, as a result of cooking more meals at home, food quality also improved (Radwan, Radwan, and Radwan 2021), as meals became more varied and health (Philippe et al. 2021; Radwan, Radwan, and Radwan 2021). On the other hand, increased amount of food in the household had negative impacts on food consumption patterns in children, such as overeating or increased eating frequency and snacking (Dou et al. 2021; Menon et al. 2022), which led some parents to express concerns about their children weight (Farello et al. 2022; Philippe, Issanchou, and Monnery-Patris 2022).

Evidence shows that cooking dinner frequently at home is associated with consumption of a healthier diet (Wolfson and Bleich 2015); as a result, meal preparation at home is increasingly being promoted as an obesity reduction measure (Nestle 2010; Smith, Ng, and Popkin 2013). On the other hand, the consumption of food prepared away from home is associated with a lower quality diet and a higher body mass index (BMI) (Guthrie, Lin, and Frazao 2002; Todd, Mancino, and Lin 2012). Still, healthy cooking depends on individual's ability to use healthy ingredients and techniques (e.g., grilling or steaming *v.* deep frying or sautéing) (Wolfson and Bleich 2015). As degradation of traditional cooking skills progresses (Caraher et al. 1999), meals at home often include processed foods with 36 % of dishes being purchased in their finished form or finished entirely to package directions (Beck 2007). The exceptional circumstances of the lockdown provided a positive opportunity for more cooking among the general population (Sarda et al. 2022), including cooking from raw ingredients (Spyreli et al. 2021), which overall was associated with eating more fresh products, including fruits and vegetables (Sarda et al. 2022), and thus better

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diet quality and health status. Others, however, reported a decline in their diet quality due to consumption of comfort food and snacking (X. Wang et al. 2020; Rodríguez-Pérez et al. 2020; Sarda et al. 2022), or food supply issues (Sarda et al. 2022). Research conducted during the COVID-19 pandemic supports previous evidence linking mood states with eating behaviors (Marty et al. 2021; L. D. Renzo et al. 2020). For example, a French study showed that mood associated with the pandemic increased intake of processed meat and sweet-tasting and alcoholic beverages (Marty et al. 2021), whereas in Italy, comfort eating and overall increase in food intake was observed to improve sense of wellbeing (L. D. Renzo et al. 2020).

These negative trends in eating behavior during the lockdown may be particularly problematic because the increased consumption of "comfort" foods was combined with the dramatic reduction in energy expenditure, leading to energy imbalance and thus to weight gain (Pellegrini et al. 2020). Indeed, evidence shows that a significant part of the population gained weight during the lockdown (Zupo et al. 2020). Changes in cooking frequency also varied among population subgroups, as individuals in financial difficulty tended to cook less (Sarda et al. 2022); in this sense, the lockdown increased social health inequalities. Previous research suggests that even in low resource areas people can find healthier dietary alternatives (Grimes et al. 2008; Parker et al. 2012), however, social support is necessary to help people integrate those healthier foods into their diet (Tsai et al. 2007). Adequate strategies are needed to address poorer dietary choices of individuals by educating about healthy cooking and snacking in general, and to further support nutritionally vulnerable populations in particular.

3.4. Parents interacting more with their children, but also being more lenient

Parents interacting more with their children around food, including cooking, conversations, menu planning, gardening and eating (Nanayakkara et al. 2022; Radwan, Radwan, and Radwan 2021), was one of the most favorable outcomes of the pandemic crisis. Families enjoyed spending time together (Nanayakkara et al. 2022; Philippe, Issanchou, and Monnery-Patris 2022), and some parents also described that these moments became opportunity for transmitting food-related knowledge (Philippe, Issanchou, and Monnery-Patris 2022). Knowledge about food has been shown to influence food decisions (Spronk et al. 2014; Akkartal and Gezer 2020) and inform meal planning (Briley et al. 1989), the latter which has been linked with an improved diet quality and less obesity (Ducrot et al. 2017). Also, the importance of maternal nutrition knowledge on the diet quality of children/adolescents has been reported in several studies (Campbell et al. 2013; Gibson, Wardle, and Watts 1998), including considerations for the mediating effect of the home environment (Tabbakh and Freeland-Graves 2016). Although people may use nutrition knowledge to change their eating behavior, this knowledge alone is unlikely to be effective (Baranowski 1995), unless combined with ability to apply it and motivation to change behavior (Fogg 2009). For example, skills and knowledge on cooking may influence balanced food choices (Hartmann, Dohle, and Siegrist 2013), as individuals with lower cooking skills are more likely to consume food away from home (van der Horst, Brunner, and Siegrist 2011), which is often rich in energy, fat and sugar and lack vegetables (van der Horst, Brunner, and Siegrist 2011; Guthrie, Lin, and Frazao 2002; Todd, Mancino, and Lin 2012).

Parental food involvement is one of many different factors that shape the development of children's food preferences and eating behaviors during the first years of life (Savage, Fisher, and Birch 2007); this is because caregivers act as powerful socialization agents in terms of both food providers and food models (Hardy, Wadsworth, and Kuh 2000; Hendy 2002; Young, Fors, and Hayes 2004). For example, evidence shows that parental food involvement predicts child preference or intake of fruits and vegetables (Ohly et al. 2012; Boutelle et al. 2003), and may influence consumption of 'healthy' foods more than 'unhealthy' foods (Ohly et al. 2012); on the other hand, low food involvement has been associated with poor diet quality (low intakes of fruits and vegetables) in women (Barker

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et al. 2008), and lack of parental time has been attributed to one of the risk factors which can cumulatively lead to excess childhood weight gain (Robinson, Yardy, and Carter 2012). Similarly, in one systematic review of parenting styles, feeding styles, feeding practices, and weight status in 4-12 year-old children, uninvolved, indulgent or highly protective parenting has been associated with higher BMI, whereas authoritative parenting has been associated with a healthy BMI (Shloim et al. 2015).

Moreover, involving children in food preparation had a positive effect on their eating behavior, as children would have more interest in and accepted certain foods more easily when they had helped to prepare them (Philippe, Issanchou, and Monnery-Patris 2022). This included involving children in gardening (Nanayakkara et al. 2022; Radwan, Radwan, and Radwan 2021), which may encourage taste testing and increase fruit and vegetable intake in children (Davis et al. 2021). Additionally, several experimental studies have shown that gardening is linked to lower obesity levels in adults (Park et al. 2016; Zick et al. 2013), improves lifestyle sustainability (Tharrey et al. 2020; Mancebo 2018), and may become a solution to address global warming (Mancebo 2018). Previously identified barrier to parent involvement include time poverty, lack of access, lack of financial resources, and lack of awareness (Williams and Sánchez 2013). Greater family interactions facilitated by the social lockdown should be preserved and further promoted by addressing barriers to parent involvement outside times of pandemic.

On the other hand, parents became more permissive when they changed their feeding practices during the Covid-19 pandemic. Indulgent feeding style, being characteristic of parents who encourage eating with few request (Hughes et al. 2005), has been associated with higher child BMI (Shloim et al. 2015). Permissive feeding style is one example of the specific parental feeding styles that may be affected by parent emotional distress (Hughes et al. 2015), including parental stress during the lockdown (Jansen et al. 2021); for example, stress associated with the lockdown may be linked to child snack intake with potential impacts on child obesity risk (Jansen et al. 2021). Parents may also experience higher levels of stress and depressed mood in the context of food insecurity exacerbated by the Covid-19 crisis (Swinnen and McDermott 2020; FSIN and Global Network Against Food Crises 2021), which has been linked to parents using pressure-to-eat feeding practices (e.g., pushing people to eat food) to not waste food (Wolfson and Bleich 2015). Parental stress has been previously shown to result in poorer feeding practices (Gouveia, Canavarro, and Moreira 2019), including differences between food secure and food insecure families (Berge et al. 2020); for example, parents from insecure household were more likely to engage in restrictive feeding practices and serve more pre-prepared foods, whereas parents from food secure households were more likely to engage in pressure-to-eat feeding practices, serve more fast food, and to have children who engaged in picky eating behaviors (Berge et al. 2020).

Greater use of non-nutritive feeding during the lockdown was also related to soothing, especially with yonder children (Jansen et al. 2021). Younger children require more guidance, including providing more structure around meals and restricting snacks (Jansen et al. 2021), but instead are more often subjected to instrumental feeding and emotion-based snack feeding by their parents (Jansen et al. 2021). Mindful parenting can help children/adolescents engage less in disordered eating behaviors through lower levels of parenting stress followed by less frequent use of food as a reward (Gouveia, Canavarro, and Moreira 2019). Stress management and educating parents about mindful child-feeding practices may have an important role in promoting healthier eating behaviors among children/adolescents during future lockdowns, as well as may become a part of ongoing efforts to address dysfunctional parental practices around food.

3.5. New trends in food shopping and meal planning

Some families experienced practical inconveniences with grocery shopping (Philippe, Issanchou, and Monnery-Patris 2022), including food shortages and raising prices (Spyreli et al. 2021; Carroll et al. 2020); others had concerns about social exposure,

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resulting in reduced travel frequency to shops (Ferrante et al. 2021). In response to these new challenges in food shopping, behaviors aimed at self-sufficiency emerged, such as bulk purchasing and stockpiling (Menon et al. 2022), followed by "panic shopping" (Spyreli et al. 2021) and adoption of meal planning skills (Menon et al. 2022; Philippe, Issanchou, and Monnery-Patris 2022) and online grocery shopping behaviors (Menon et al. 2022; Ferrante et al. 2021).

The pandemic poses major threats to global food security, including breaks in the food supply chain, food shortages and choice limitation, and food price spikes and volatility (Laborde et al. 2020; Jiang, Chen, and Wang 2021). Resulting bulk purchasing and stockpiling were significantly correlated with increased food purchase, which in turn led to increased food waste (Babbitt, Babbitt, and Oehman 2021). Observed or perceived lack of resources due to COVID-19 also led to panic shopping, which has been viewed in positive terms as preparedness behaviors (increased shopping as a response to other people stockpiling, to reduce their trips to supermarkets, or to prepare for product shortages and longer stays at home) (Ntontis et al. 2022), but overall is a dangerous phenomenon given it causes the supply disruption of products, increased prices, and long waiting lines at the stores (Akhtar et al. 2020; Tsao, Raj, and Yu 2019). Panic buying is not caused by supply deficit per se, but by consumers' heightened anxiety and fear (Tsao, Raj, and Yu 2019). During the COVID-19, scarcity messages with limited quantity and time significantly developed perceived arousal, which in turn led to more impulsive and obsessive buying (Islam et al. 2021).

On a positive side, panic buying is a rare phenomenon (Quarantelli 1999), and when panic occurs, it only influences a small group of people for a short period of time (Perry and Lindell 2003). More importantly, problems with food availability and increased prices were not universally experienced due to differences in market resilience (Dou et al. 2021). For example, Chinese food availability scored higher than the U.S because of more versatile and diverse food retail sector in China combined with proactive and progressive food security policies in urban planning implemented across the country (Dou et al. 2021); on the other hand, food prices held steady in the U.S. as opposed to price volatility in China for reasons yet to be examined (Dou et al. 2021).

During the pandemic, many people also resorted to online shopping (Mason, Narcum, and Mason 2020; UNCTAD and Netcomm Suisse Observatory 2020), which has surged during the pandemic and eventually became unreliable (Spyreli et al. 2021), as retailers have been failing to keep pace with high continuous demand. For example, in India, stay at home has augmented the number of first-time users, earlier who were inhibited to shop online (Sharma and Jhamb 2020). Common barriers to buying online include the security of transaction, the difficulty in using IT tools and the quality of the delivery service, also linked to the characteristics of the product (Huang and Oppewal 2006), whereas perceived sustainability in purchasing online has been found to increase customer engagement (Pei et al. 2020). During the pandemic, the shift to online shopping was caused by the closure of stationary retail stores (Koch, Frommeyer, and Schewe 2020) or concerns regarding COVID-19 (e.g., shopping inside grocery stores, avoiding public crowded gatherings) (Grashuis, Skevas, and Segovia 2020). Despite many benefits of online shopping (Shankar, Smith, and Rangaswamy 2003; Chu et al. 2010), experiences during the lockdown were mixed due to difficulty in finding delivery slots and incomplete food deliveries (Spyreli et al. 2021).

The long-term effects of the pandemic on online grocery shopping will require further analysis. It is possible that the digital-online shopping adoption becomes permanent (Capgemini 2020), which however, would have to be accompanied by grocers and retailers reidentifying their marketing strategies and enhancing online shopping service to better serve online grocery shoppers; on the other hand, many online shoppers may choose to return to brick-and-mortar shopping when pandemic conditions subside, depending on the user's intention for continuance usage of online shopping and their overall motivation to do so (Grashuis, Skevas, and Segovia 2020; Jensen et al. 2021). Nevertheless,

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online shopping seems to be the way forward in terms of promoting sustainability paths by decreasing the quantity of shopping trips (Saha et al. 2021), and thus achieving an ecological long-term stability in line with the 2030 Agenda's sustainable development goals (SDGs) ("Transforming Our World: The 2030 Agenda for Sustainable Development" 2018).

Finally, as a result of food security issues, meal planning significantly improved. Benefits of meal planning for diet and health are multiple, including links between meal planning and food consumption, diet quality, and weight status (Ducrot et al. 2017; J. and M. 2011; Crawford et al. 2007; Trofholz et al. 2016). Specifically, meal planning, which consists in deciding ahead the foods that will be eaten in the next few days, has been positively associated with frequencies of home meal preparation (J. and M. 2011) and family meal (McIntosh et al. 2010), food variety, diet quality and body weight status (Ducrot et al. 2017), and fruit and vegetable intakes (Crawford et al. 2007), including presence of fruits for dinner (Trofholz et al. 2016). Moreover, in previous research planning meal ahead was also seen as a tool to maintain weight among successful weight losers (Kruger, Blanck, and Gillespie 2006), or a solution to balance competing time demands and reduce barriers to healthy dietary practices (Virudachalam et al. 2016). During the pandemic, increase meal planning led to reduced household food waste (Babbitt, Babbitt, and Oehman 2021; Çavuşa, Bayhan, and Ismail 2022), which was also correlated with behaviors focused on preserving foods, and using leftovers and shelf-stable items (Babbitt, Babbitt, and Oehman 2021). Private households have been identified as key actors in food waste generation (Schanes, Dobernig, and Gözet 2018), which has been attributed to resource depletion and greenhouse gas emissions (Schanes, Dobernig, and Gözet 2018). It is therefore encouraging that over 60% of respondents who started or increased efficient food use behaviors declared that they intend to continue these activities after the pandemic (Babbitt, Babbitt, and Oehman 2021). Moreover, it was also shown that even in times of pandemic characterized by food scarcity constrains, a palatable and diversified diet can be purchased very inexpensively from supermarkets, and visits to the supermarket can also be limited to one per month to reduce dangerous exposure, given effective meal planning is put in place (T. Joanis 2020). These results may offer insights for future resource and strategies relating to meal planning and waste management.

3.5. Uneven burden of COVID-19 on families

The impacts of COVID-19 on diet have not been felt uniformly across society. For poor families, family's food needs had increased during the pandemic and food-related support was critical, especially among single parents (Spyreli et al. 2021). Distributions for changes in the amount of total food, high-calorie snack foods, desserts/sweets, fresh foods, and non-perishable foods in the home differed by food security status (Adams et al. 2020); also, greater changes in parents' concern about child overweight and pressure to eat were observed for families experiencing food insecurity, compared with food-secure families (Adams et al. 2020). Deals and reduced-to-clear items remained important part of families' diet, however, infrequent shopping trips and reliance on unreliable supermarket home deliveries further compromised home food availability in fresh food products (Spyreli et al. 2021). Moreover, single-parent families may have found it more challenging to adopt a healthy diet during the COVID-19 lockdown/s compared to parents living with partner (Spyreli et al. 2021); for example, one study found that single parents had less time for meal provisioning at home because they had to entertain their children who otherwise would be at school (Spyreli et al. 2021). One rapid review of qualitative evidence on parental perceptions of the food environment and their influence on food decisions among low-income families confirms these results, arguing that child preferences, financial and time constraints, as well as location and access to food outlets were barriers to accessing healthy food, whereas social support from families or government sources was important but short-term solutions to health and nutritional inequities (Ravikumar et al. 2022).

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People who are socioeconomically disadvantaged tend to have decreased access to healthy food retail outlets (Block and Kouba 2006), such as supermarkets and grocery stores, and increased access to fast-food outlets where cheaper unhealthy food is readily available (Fleischhacker et al. 2011). This has been known as a paradox of the obesity and poverty relationship attributed to both the easy availability and low cost of highly processed foods, but also higher unemployment and affordability constrains, lower education levels, and irregular meals in the population of poor people (Żukiewicz-Sobczak et al. 2014). As affordability constraints remain an important determinant that relates to differences in obesity prevalence across geographical areas, it has been recommended that improving physical access to supermarkets and improving economic access to healthy foods are two valid strategies to deal with the obesity epidemic (Drewnowski et al. 2012). Recently, COVID-19 introduced new drivers of food insecurity, in addition to financial hardship faced by low-income households, by limiting access to food in terms of basic supplies and through isolation (Goudie and McIntyre 2021). As a result, in the UK, a newly vulnerable group who were financially stable pre-Covid emerged, making reliance on overstretched food banks and food aid charities no longer a sustainable solution to food insecurity (Goudie and McIntyre 2021). On the other hand, even in times of pandemic, healthy diet can be maintained inexpensively through infrequent visits to the supermarket (T. Joanis 2020). Nevertheless, sustainable changes to dietary habits for families on low-income requires policy responses to low income, food access and to the high cost of healthy foods (Ravikumar et al. 2022).

3.6 Limitations

This review comprehensively examined the evidence relating to general parental food perspectives during the COVID-19 pandemic, however, it is not without its limitations. Studies retrieved using the search strategy were limited by the coverage of the search terms used, and their inclusion in the final synthesis was judgement by only one author. It should also be noted that no papers were excluded from the final analysis on the basis of quality appraisal, which could have compromised the strength of this review's findings; on the other hand, as all the relevant studies were included, this has likely contributed to a more well-rounded synthesis.

5. Conclusions

The pandemic had profound impacts on household food dynamics, including both positive and negative changes, such as increase in overall food intake comprised of home-cooked meals on the one hand, and increased snacking on the other hand. Most children had diverse and well-balanced meals served at regular times, but this was offset by flexible and lenient parenting feeding style and irregular snack times. Moreover, household food security deteriorated among families with the lowest income. Finally, adoption of meal planning skills and online grocery shopping behaviors took place, the former resulting in healthier diet and less food waste. The durability of the changes and how widespread they might be across large populations deserve further study.

Supplementary Materials: The following supporting information can be downloaded separately, Table A1: additional characteristics of full-text studies included in the review.

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Appendix A

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Table A1. Additional characteristics of full-text studies included in the review.

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