



Food-related parenting practices and styles in households with sibling children: A scoping review

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ABSTRACT

Interventions that promote responsive feeding in early childhood have been shown to reduce obesity risks. However, interventions mostly target parent-child dyads without considering the complexities of implementing responsive feeding across multiple children within a family unit. This scoping review aims to assess the extent and nature of current literature examining feeding in the context of siblings. Six electronic databases were searched (APA PsycINFO, CINAHL, Embase, Medline, ProQuest Dissertations & Theses Global, and Scopus) for articles published up until November 25, 2021. Studies were included if they compared the use of parent feeding practices and/or styles for two or more siblings aged ≤ 18 years. Data were extracted from relevant studies and analysed using basic descriptive statistics. A total of 18 studies from North America ($n = 12$) and Europe ($n = 6$) were included, with the majority targeting children between 6 and 18 years of age ($n = 12$). All studies were cross-sectional, with most designed to test differences in parent-reported feeding practices for siblings, primarily restriction and/or pressure to eat, in relation to differences in their characteristics ($n = 12$). The studies provide some evidence that parents may modify certain feeding practices or styles for siblings in response to differences in their characteristics, such as weight status and eating behaviours. Future research should examine processes that underlie feeding decisions in the context of siblings, including the contexts and consequences of differential feeding, with particular focus on early childhood when feeding interventions may be most effective.

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1. Introduction

Overweight and obesity affects 38.9 million (5.7%) children under five years of age (World Health Organization, 2021), resulting in extensive health, economic, and social implications (Blüher, 2019). Infancy, toddlerhood, and early childhood are critical periods for the establishment of eating behaviours and food preferences that may contribute to obesity risk (Freitas, Albuquerque, Silva, & Oliveira, 2018). During these periods, parents play a prominent role in scaffolding the food environment for their children. They assume primary

responsibility for food procurement, preparation, and provision in the home and interact with children to either facilitate or limit their food consumption (Yee, Lwin, & Ho, 2017). While it is widely assumed that children are born with an intrinsic capacity to self-regulate their energy intake (McCrickerd, 2018), how children are fed by their parents may foster or undermine this capacity, and in turn, affect their obesity risk (Boswell, Byrne, & Davies, 2019).

1.1. Parent feeding styles and practices

In the literature, parent feeding is typically discussed in terms of *styles* and *practices*. Feeding styles describe general behaviours that are applied by parents across different food-related contexts (Blissett, 2011). Depending on their degree of responsiveness and demandingness,

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parents may be allocated one of four styles: authoritative, authoritarian or disciplinarian, permissive or indulgent, and neglectful or uninvolved (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005). Feeding styles are relatively stable traits that are thought to dictate the socioemotional climate in which more specific practices are enacted (Blissett, 2011). Such practices may be classified into three broad domains: coercive control, structure, and autonomy support or promotion (Vaughn et al., 2015). Coercive control describes the use of dominance or intrusiveness over a child's eating behaviours, and includes practices such as pressure to eat, overt restriction, and food to reward or calm a child (Vaughn, Tabak, Bryant, & Ward, 2013). They are parent-centred in nature, distinguishing them from practices within the latter two domains that are characterised by a degree of responsiveness to the emotional, psychological, and physiological needs of a child to promote self-regulation (Vaughn et al., 2013). Examples of feeding practices within the domains of structure and autonomy support or promotion include the use of monitoring and encouragement to eat, respectively.

Research supports the complex and bidirectional relationships between parent feeding practices, child eating behaviours, and child weight status (Wood et al., 2020). Interventions that promote responsive feeding have been delivered to parents, resulting in favourable child health outcomes (Redsell et al., 2016). However, most interventions target parent-child dyads without considering the complexities of implementing responsive feeding across multiple children within a family unit. Research also demonstrates that parents may be less likely to engage in routine preventative healthcare with later-born children (Alexander, Brijnath, & Mazza, 2015). Studies from the SIBSIGHT cohort in the United States have shown that a responsive parenting program with first-born infants may have certain spill-over effects on the feeding (Ruggiero, Hohman, Birch, Paul, & Savage, 2020), dietary intakes (Hohman, Savage, Birch, & Paul, 2020), and weights (Savage et al., 2022) of subsequent siblings. However, it remains unclear as to whether interventions are applicable to and effective for parents with more than one child.

1.2. The role of siblings at mealtimes

Growing up with a sibling is common. In the United States, United Kingdom, and Australia, approximately 60% of parents reside with two or more children (Australian Bureau of Statistics, 2020; Office of National Statistics, 2020; United States Census Bureau, 2020). In early childhood, a period which is marked by rapid cognitive and socioemotional development (Georgieff, Brunette, & Tran, 2015), siblings are commonly present at mealtimes within the home (Moding & Fries, 2020). However in the literature, the impact of siblings on children's eating behaviours is unclear (Ragelienė & Grønhoj, 2020). This is despite a growing body of research indicating that only and last-born children may be at higher risk of overweight and obesity compared to first-born children (Park & Cormier, 2018).

It has been recognised that siblings may affect socialisation processes through their direct interactions with one another (McHale, Updegraff, & Whiteman, 2012). Mosli, Miller, et al. (2015), for example, observed mothers and their 4- to 8-year-old children during mealtimes when a sibling was present. The authors found that siblings encouraged one another to eat, with later-born children tending to receive more encouragements from their sibling when compared to earlier-born children (Mosli, Miller, et al., 2015). Siblings may also influence one another by imitating their parents. In a subsequent analysis from this sample, the number of encouragements provided by siblings was positively associated with feeding practices used by their mothers, including pressure to eat, coercion, verbal direction, and restriction (Mosli, Miller, Peterson, & Lumeng, 2016). This demonstrates that by replicating or reinforcing parent feeding practices, siblings may serve as direct role models or caregivers in the home.

Siblings may also impact children indirectly, by virtue of their role and position within the family system (McHale et al., 2012). For

example, in 4- to 8-year-old children, mothers tended to praise healthy eating behaviours less frequently in children who, in their family, were the youngest compared to the oldest sibling, which partially mediated the association between youngest sibling status and higher overweight and obesity risk (Mosli, Lumeng, et al., 2015). It is speculated that such relationships may be explained through social or psychological processes, such as parents needing to distribute their time and resources between siblings. However, when analysing structural variables, for example, birth order and sibship size, these processes must be inferred rather than directly measured (McHale et al., 2012). Beyond these variables, siblings can also differ remarkably in characteristics such as weight status, temperaments, and eating behaviours (Plomin & Daniels, 1987). Therefore, analysis of children *within* rather than *between* families is necessary to capture the complexities of feeding in the context of siblings.

1.3. A theoretical basis for exploring responsive feeding in the context of siblings

Due to the bidirectional nature of the feeding relationship, it is recognised that parents not only drive changes in their children's eating behaviours and weight status, but that children may also elicit certain responses from their parents (Beckers, Karssen, Vink, Burk, & Larsen, 2021). Family systems theory further posits that the family is a complex, interrelated system that cannot be comprehended by analysing subsystems (e.g., parent-child, sibling-sibling) in isolation from one another (Broderick, 1993). The feeding relationship, therefore, is not only bidirectional in nature, but also interactive with the other subsystems within the family (Broderick, 1993). Exploring how parents implement feeding practices and styles across multiple children may provide a window into the broader operation of families as socialising systems. Feeding interventions may then be designed to acknowledge how siblings affect the feeding practices and styles that are experienced by a child (Ruggiero, McHale, Paul, & Savage, 2021). While interventions currently exist to support parents in managing sibling behaviours (Pickering & Sanders, 2016), they are yet to be adapted to the context of obesity prevention. Such interventions have the capacity not only to act as effective vehicles for engaging parents in preventative healthcare but may also result in certain spill-over effects on siblings, minimising the costs and resources associated with repeated interventions.

1.4. Aims and objectives

The aim of this scoping review is to assess the extent and nature of literature examining parent feeding practices and styles across two or more children within the same family unit. To the authors' knowledge, this review is the first to explore feeding in the sibling context. A scoping review has the capacity to map existing literature and identify potential gaps in knowledge (Munn et al., 2018). Thus, the objectives of this review are to examine the geographical, demographic, and social settings in which parent feeding has been examined with siblings. In addition, it will identify methodologies and methods that have been used to compare feeding practices and styles between siblings and synthesise outcomes from existing data.

2. Methods

2.1. Protocol and registration

The protocol for this scoping review was designed in accordance with the Joanna Briggs Institute (JBI) methodological guidance for scoping reviews (Peters, Godfrey, et al., 2020; Peters, Marnie, et al., 2020) and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018) (Supplementary Table 1). The protocol was registered with Open Science Framework on July 28, 2021

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2.2. Eligibility criteria

To be considered for inclusion in this review, studies needed to compare the use of parent feeding practices or styles between two or more siblings. Journal articles, theses, and dissertations were included with a focus on empirical data from quantitative, qualitative, and mixed-methods studies. Studies targeting both siblings and twins were included if children were aged ≤ 18 years. Due to the implications of parenting children with a clinical diagnosis, studies were excluded if they targeted children with a chronic disease, disorder, syndrome, or condition. To align with the definitions of feeding practices and styles outlined in this review, studies were also excluded if they focused only on milk-feeding methods (breastfeeding, bottle feeding) or complementary feeding.

2.3. Search strategy

Six electronic databases were searched (APA PsycINFO, CINAHL, Embase, Medline, ProQuest Dissertations & Theses Global, and Scopus) for articles published up until November 25, 2021. The search strategy was developed by one author (SA) based on terms identified in the relevant literature. It was then refined through discussion amongst all authors and consultation of a research librarian. A combination of key words and index terms were searched in the title, abstract, and key word (if available) fields of each database (Table 1). Index terms and proximity operators were adapted to align with the functionality of each database (Supplementary Table 2). The reference list of all included articles, theses, and dissertations were screened for additional sources. Following the search, all identified citations were collated and uploaded into EndNote 20 (Clarivate Analytics, 2020). Duplicates were removed and the remaining citations were uploaded into Rayyan (Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016) for screening.

2.4. Study selection

Study selection was undertaken by two independent authors (SA and RB, HH, or MW). Firstly, the titles and abstracts of all citations were screened against the eligibility criteria. Potentially relevant sources were then retrieved and uploaded in their full-text formats for the second phase of screening. Discrepancies in both phases were resolved through consensus or by the decision of a third author. Reasons for exclusion of the studies during the full-text review were documented (Supplementary Table 3). All sources that met the eligibility criteria were included in the scoping review.

2.5. Data extraction and analysis

For each source, a standardised form was used to extract data on publication characteristics, including the authors, publisher, and date, in addition to the study aims, methodology, theoretical framework, design, location, participants, methods, variables, and results

(Supplementary Table 4). The form was initially piloted on four studies (two quantitative and two qualitative) by two independent authors (SA and RB or HH) to ensure that all relevant data were captured. Data were then extracted from each study by one independent author (SA), with results verified by a second independent author (RB or HH) and discrepancies resolved through consensus. The results were summarised and presented in narrative and tabular formats. Descriptive analyses (i.e., frequency counts) were used to examine the scope of the available literature. Quantitative results were organised based on the feeding practices or styles measured, and qualitative results were coded and categorised in an iterative process in NVivo (QSR International, 2020) to identify recurring concepts.

3. Results

3.1. Overview of included evidence

After duplicates were removed, a total of 880 citations were identified through searches of electronic databases. Of these citations, 18 (14 quantitative and 4 qualitative) met the eligibility criteria and were included in the review. Fig. 1 displays the PRISMA flow diagram of the study selection process (Moher, Liberati, Tetzlaff, & Altman, 2009).

3.2. Overview of included evidence

Table 2 provides an overview of the characteristics of included studies. The studies were conducted in North America ($n = 12$) and Europe ($n = 6$). Several studies analysed data from existing cohorts, including sibling cohorts in North Carolina ($n = 3$) (Horn, Galloway, Webb, & Gagnon, 2011; Payne, Galloway, & Webb, 2011; Pulley, Galloway, Webb, & Payne, 2014) and Minnesota (Family Meals, LIVE! Siblings Edition) ($n = 2$) (Berge, Tate, Trofholz, Conger, & Neumark-Sztainer, 2016; Berge, Trofholz, Schulte, Conger, & Neumark-Sztainer, 2016), which were designed to explore feeding interactions in families. In addition, a cohort of same-sex siblings discordant on weight status in New York was designed to explore factors contributing to differences in energy intake and adiposity in children ($n = 2$) (Roemmich, White, Paluch, & Epstein, 2010; Ufholz, Salvy, Fed, Epstein, & Roemmich, 2020). Sample sizes ranged from 5 to 2164 sibling pairs, with the majority of studies based on relatively small samples (≤ 88 sibling pairs) ($n = 16$). Most studies were published within the last decade ($n = 12$) and by journals relevant to the field of nutrition and dietetics ($n = 11$) or endocrinology ($n = 3$). While data were collected for both mothers and fathers in five of the studies, most studies included either all mothers or a large proportion (79–98%) of mothers ($n = 13$). Of the 15 studies that reported on parental race or ethnicity, the majority were also confined to either all or mostly (25–93%) white families ($n = 12$). Most studies reported data on at least one proxy of socioeconomic status, including annual household income, social class, parental educational attainment, and parental employment status or occupation ($n = 14$). However, fewer studies reported data on family structure and composition ($n = 8$). Although the majority of these studies appeared to

Table 1
Search strategy used to retrieve articles on parent feeding in the context of siblings.

	Key concepts			
	(1) Feeding	(2) Practice	(3) Parent	(4) Sibling
Search terms^a	Feeding OR food* OR meal* OR eat*	Practice* OR behavio* OR style* OR strateg* OR method* OR approach* OR dimension* OR interaction* OR relationship* OR environment* OR structur* OR control* OR restrict* OR pressure* OR monitor* OR reward* OR responsive	Parent* OR mother* OR mum* OR mom* OR maternal OR father* OR dad* OR paternal OR caregiver* OR caretaker*	Sibling* OR brother* OR sister* OR twin*
Search algorithm^b	(1) W/1 (2) AND (3) AND (4)			

^a '*' indicates truncated terms.

^b 'W/1' indicates a maximum distance of one word between terms in any order.

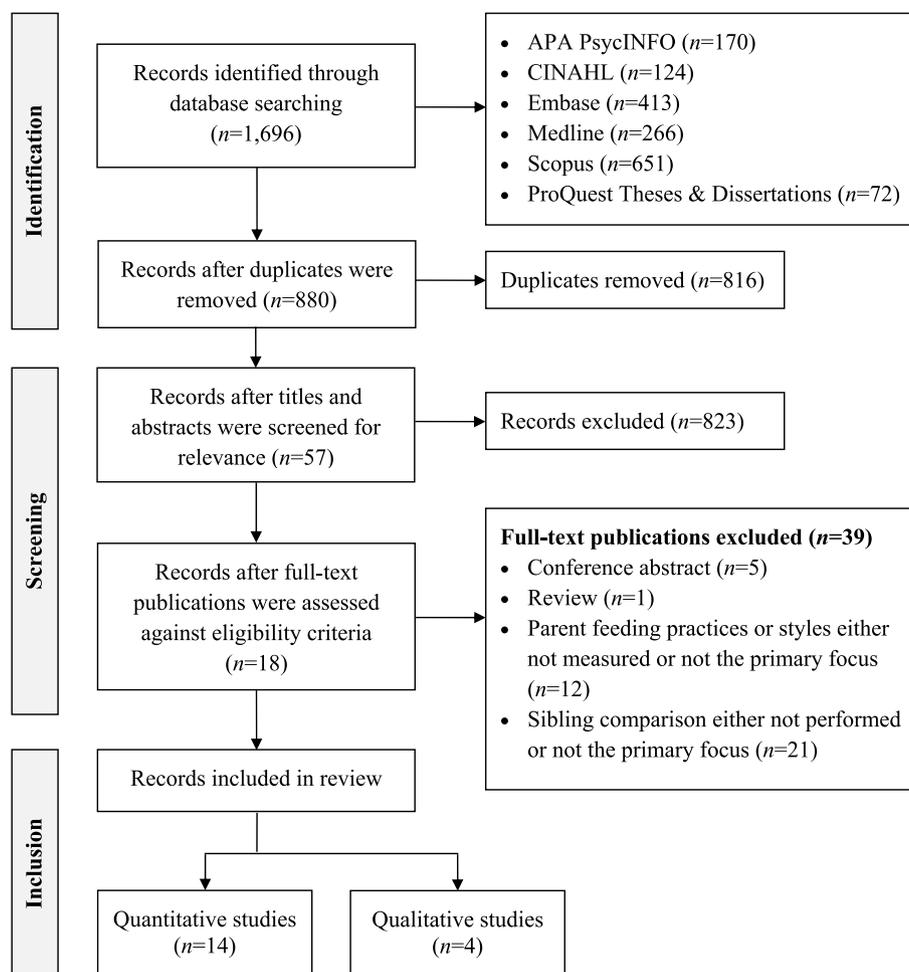


Fig. 1. PRISMA flow diagram of systematic search of the literature (Moher et al., 2009).

be limited to mostly tertiary educated and working middle-class families, three studies specifically recruited socioeconomically diverse families through the Family Meals, LIVE! Siblings Edition cohort (Berge, Tate, et al., 2016; Berge, Trofholz, et al., 2016), or the Eating and Activity in Teens (EAT) and Families and Eating and Activity in Teens (F-EAT) cohorts (Berge, Meyer, Maclehorse, Loth, & Neumark-Sztainer, 2016). Specific demographic characteristics are outlined in Supplementary Tables 5 and 6

Targeted age ranges for siblings varied from 1 to 18 years, with the majority of the studies targeting school-aged children aged between 6 and 18 years ($n = 12$) (Table 3). In addition, only two studies focused exclusively on children under 5 years of age, one of which targeted 16-month-old twins (Harris, Fildes, Mallan, & Llewellyn, 2016) and one of which targeted 2- to 3-year-old siblings (Damen, Steenbekkers, Fogliano, & Luning, 2020). In several study designs, the siblings recruited were concordant on traits such as sex (Bosk, 1988; Roemmich et al., 2010; Tripicchio et al., 2014; Ufholz et al., 2020) and age (twins or retrospective data collection for one sibling) (Damen et al., 2020; Harris et al., 2016; Selzam et al., 2018; Tripicchio et al., 2014). In other designs, researchers intentionally recruited siblings discordant on traits such as weight status (Bosk, 1988; Roemmich et al., 2010; Saelens, Ernst, & Epstein, 2000; Ufholz et al., 2020) or during analysis, identified subsamples of siblings discordant on traits such as sex (Berge, Meyer, et al., 2016), weight status (Berge, Meyer, et al., 2016; Berge, Tate, et al., 2016; Moens, Braet, & Vandewalle, 2013), and eating behaviours (Harris et al., 2016). Few studies reported on methodologies ($n = 1$) and theoretical frameworks ($n = 4$) used.

3.3. Summary of results

The studies included in this review provide evidence of within-family differences and similarities in parent feeding practices and styles and indicate potential factors driving these behaviours. Fig. 2 illustrates a conceptual model that summarises these relationships as captured in the data.

3.3.1. Quantitative studies

Of the 14 quantitative studies included in this review, 13 assessed parent feeding practices using cross-sectional surveys (Table 4). The most frequently used survey was the Child Feeding Questionnaire (CFQ) ($n = 11$), which is a parent-report survey used to measure parental restriction, pressure to eat, and/or monitoring practices (Birch et al., 2001). Several studies used versions of this questionnaire modified for use by children or adolescents in addition to or instead of parent reports ($n = 3$) (Pulley et al., 2014; Roemmich et al., 2010; Ufholz et al., 2020). In contrast, only one study assessed parent feeding styles using the observational Mealtime Family Interaction Coding Scheme (MICS) (revised version), which includes assessment of authoritarian, permissive, authoritative, and involved feeding (Dickstein, Hayden, Schiller, Seifer, & San Antonio, 1994). While several studies tested the degree of resemblance between siblings on certain feeding practices or styles ($n = 7$), the majority of studies aimed to compare these measures between siblings based on differences in their weight status, eating behaviours, food consumption, energy intake or compensation ability, temperament traits, birth order, age, and/or sex ($n = 13$).

Table 2
Study characteristics of included evidence ($n = 18$).

Characteristic		Number (n)	Percentage (%)
Study location	USA	12	66.7
	UK	4	22.2
	Belgium	1	5.6
	The Netherlands	1	5.6
Study cohorts	Sibling cohort in North Carolina	3	16.7
	Sibling cohort in New York	2	11.1
	Family Meals, LIVE! SE	2	11.1
	EAT and F-EAT	1	5.6
	Gemini	1	5.6
	PEACHES	1	5.6
	Project Grow-2-Gether	1	5.6
	TEDS	1	5.6
	Not applicable	6	33.3
	Sample size^a	1–19	6
20–39		2	11.1
40–59		2	11.1
60–79		3	16.7
80–99		3	16.7
100–999		0	0.0
≥1000		2	11.1
Year of publication		2016 or later	7
	2011–2015	5	27.8
	2006–2010	4	22.2
	2001–2005	0	0.0
	2000 or earlier	2	11.1
Subject area of publishing journal	Nutrition and dietetics	11	61.1
	Endocrinology	3	16.7
	Paediatrics	1	5.6
	Psychiatry and mental health	1	5.6
	Genetics	1	5.6
	NA	1	5.6
Record type	Journal article	17	94.4
	Thesis	1	5.6
Study population	All mothers	7	38.9
	Majority mothers	6	33.3
	Both mothers and fathers	5	27.8
Participant ethnicity^b	All Caucasian	2	11.1
	Majority Caucasian	10	55.6
	Majority African American	3	16.7
	Not reported	3	16.7
	Education	2	11.1
Assessment of participant family SES	Education; employment/occupation	3	16.7
	Education; class/income	1	5.6
	Education; employment/occupation; class/income	2	11.1
	Employment/occupation; class/income	3	16.7
	Class/income	3	16.7
	Not reported	4	22.2
	Parental relationship status	3	16.7
Assessment of participant family structure and composition	Parental relationship status; number of children	4	22.2
	Parental relationship status; number of household members	1	5.6
	Not reported	10	55.6

EAT, Eating and Activity in Teens; F-EAT, Families and Eating and Activity in Teens; PEACHES, Physical Exercise and Appetite in Children Study; SE, Sibling Edition; SES, socioeconomic status; TEDS, Twins Early Development Study; UK, United Kingdom; USA, United States of America.

^a Number of sibling pairs.

^b Based on the ethnicity of the participating parents.

3.3.1.1. Feeding practices

3.3.1.1.1. Coercive control

3.3.1.1.1.1. Restriction or control

Of the 14 quantitative studies included in this review, 13 examined the use of parental restriction or control (hereby referred to as restriction) with siblings. Intraclass correlation was used in several studies ($n = 6$) to measure the proportion of variation in parental restriction that can be attributed to variation between sibling pairs, with higher coefficients (between 0.0 and 1.0) indicating greater sibling resemblance (Breen & Ermisch, 2021). In four studies, significant coefficients ranged from 0.54 to 0.97 (Farrow, Galloway, & Fraser, 2009; Payne et al., 2011; Saelens et al., 2000; Selzam et al., 2018), while results were non-significant in two studies (Keller, Pietrobelli, Johnson, & Faith, 2006; Roemmich et al., 2010). Thus, a varying degree of resemblance in parents' use of restriction between siblings was evident.

Nine studies further assessed how differences in parental use of restriction or control related to differences in sibling weight. Based on self-reported data, four studies found that parents tended to use more restriction toward their heavier weight child relative to the lighter weight sibling (Berge, Tate, et al., 2016; Harris et al., 2016; Selzam et al., 2018; Tripicchio et al., 2014). In 10-year-old non-identical twins ($n = 2164$ pairs), Selzam et al. (2018) further demonstrated an association between parents' reports of differential restriction between siblings and body mass index (BMI) genome-wide polygenic scores, which provide a measure of inherited susceptibility to a higher BMI. In line with the findings discussed above, parents in this sample used more restriction toward the twin with a higher BMI genome-wide polygenic score; however, results were not replicated in an analysis of only same-sex twins (Selzam et al., 2018).

While Payne et al. (2011) found that parents of 6- to 12-year-old siblings ($n = 70$ pairs) tended to use more restriction toward the child whose weight they were more concerned about, they did not vary their use of restriction based on actual or perceived differences in sibling weight. Furthermore, in a more recent study on 6- to 12-year-old siblings ($n = 88$ pairs), significant differences in parental use of restriction were only found when examining a smaller subsample of siblings ($n = 29$ pairs) who were discordant on weight status (healthy weight vs. overweight) (Berge, Tate, et al., 2016). However, in this sample, parents of concordant overweight siblings were more likely to use restriction compared to parents of concordant healthy weight and discordant weight siblings (Berge, Tate, et al., 2016). Contrary to the above findings, Ufholz et al. (2020) found higher levels of child perceived restriction, both in general and in relation to certain foods, in non-overweight siblings compared to overweight siblings aged 13–17 years ($n = 38$ pairs). However, in multiple regression analyses, differences in perceived restriction were not associated with differences in sibling weight. Several other studies also found non-significant relationships between parental use of restriction (Berge, Meyer, et al., 2016; Keller et al., 2006; Roemmich et al., 2010; Ufholz et al., 2020) or control (Berge, Tate, et al., 2016) and differences in sibling weight.

Four studies examined how differences in parental restriction related to differences in eating behaviours or food consumption between siblings. Parents tended to use more restriction toward the sibling with a higher desire to drink (Farrow et al., 2009) and tendency to overeat (indicated by a lower percentage energy compensation index score) (Tripicchio et al., 2014). However, in relation to differences in food fussiness between siblings, results were mixed. In 2- to 9-year-old siblings ($n = 80$ pairs), Farrow et al. (2009) found that parents tended to use more restriction toward the fussier sibling, whereas Harris et al. (2016) found no differential use of restriction for twins at 16 months of age ($n = 1013$ pairs). Differences in other eating behaviours measured by the Children's Eating Behaviour Questionnaire (CEBQ) (Wardle, Guthrie, Sanderson, & Rapoport, 2001), such as food responsiveness, enjoyment of food, emotional eating, satiety responsiveness, and slowness in eating, were not related to differences in parental restriction (Farrow et al., 2009), nor were differences in energy intake between 8-

Table 3
Designs of included studies ($n = 18$).

Study	N^a	Sibling ages (years)	Methodology	Theoretical framework	Design	Sibling characteristics ^b	
						Concordant	Discordant
<i>Quantitative studies</i>							
Saelens et al. (2000)	18	7–12	–	–	Sibling	–	Weight status
Keller et al. (2006)	15	3–7	–	–	Sibling	–	–
Farrow et al. (2009)	80	2–9	–	Ecological systems theory	Sibling	–	–
Roemmich et al. (2010)	19	8–17	–	–	Sibling	Sex (all males)	Weight status
Horn et al. (2011)	55	6–12	–	–	Sibling	–	–
Payne et al. (2011)	70	6–12	–	–	Sibling	–	–
Moens et al. (2013)	36	4–12	–	–	Sibling	–	Weight status ($n = 10$ pairs)
Tripicchio et al. (2014)	64	4–7	–	–	Twin	Sex, age	–
Pulley et al. (2014)	70	6–12	–	Family systems theory	Sibling	–	–
Berge, Tate, et al. (2016)	88	6–12	–	–	Sibling	–	Weight status ($n = 29$ pairs)
Berge, Meyer, Maclehose, Loth, and Neumark-Sztainer (2016)	57	11–18	–	–	Sibling	–	Weight status ($n = 19$ pairs)
Harris et al. (2016)	1013	1	–	–	Twin	Age	Sex ($n = 22$ pairs) Food fussiness ($n = 274$ pairs)
Selzam et al. (2018)	2164	10	–	–	Twin	Age	–
Ufholz et al. (2020)	38	13–17	–	–	Sibling	Sex	Weight status
<i>Qualitative studies</i>							
Bosk (1988)	5	7–11	Phenomenology	Family systems theory	Sibling	Sex (all females)	Weight status
Webber et al. (2010)	12	6–15	–	–	Sibling	–	–
Berge, Trofholz, et al. (2016)	88	6–12	–	Family systems theory	Sibling	–	–
Damen et al. (2020)	17	2–3	Constructivist grounded theory	–	Sibling	Age ^c	–

^a Number of parent-sibling triads.

^b Concordant characteristics are those applicable to the whole sample and discordant characteristics are those applicable to either the whole sample or the basis on which siblings are compared in subsample analyses.

^c Retrospective comparison of first-born children at 2–3 years and second-born children at same age.

to 17-year-old siblings ($n = 19$ pairs) during a single laboratory meal-time (Roemmich et al., 2010).

The use of differential restriction was also assessed in relation to differences in sibling temperament traits in one study of 6- to 12-year-old siblings ($n = 55$ pairs) (Horn et al., 2011). Temperament traits were measured using age-appropriate Carey Temperament Scales (CTS) (Hegvik, McDevitt, & Carey, 1982; McDevitt & Carey, 1978). The scales capture various dimensions of temperament, including the level of adaptability, rhythmicity or predictability, approach, persistence, distractibility, intensity of reaction, threshold of responsiveness, and mood (Hegvik et al., 1982; McDevitt & Carey, 1978). However, the use of differential restriction was only evident in relation to differences in sibling distractibility scores, with parents tending to use more restriction toward the sibling who was more easily distracted by external stimuli (Horn et al., 2011).

Few studies explored the use of parental differential restriction in relation to differences in the sex ($n = 2$) and birth order ($n = 1$) of siblings. Based on parent-reported data, the use of restriction appeared to be consistent for siblings despite differences in their sex (Berge, Meyer, et al., 2016; Pulley et al., 2014) and birth order (Pulley et al., 2014). However, the latter finding was contradicted by sibling reports ($n = 72$ pairs), with younger siblings tending to report higher levels of parental restriction compared to older siblings (Pulley et al., 2014).

3.3.1.1.1.2. Pressure to eat

The majority of quantitative studies included in this review also examined the use of pressure to eat in parents of siblings ($n = 11$). Of these, four performed intraclass correlations to estimate the degree of sibling resemblance on parental pressure to eat. With the exception of a small pilot study of 3- to 7-year-old siblings ($n = 15$ pairs) (Keller et al., 2006), all studies found significant coefficients ranging from 0.49 to 0.91 (Farrow et al., 2009; Roemmich et al., 2010; Selzam et al., 2018).

A total of eight studies further examined how differences in parental use of pressure to eat related to differences in sibling weight. Of these studies, five found that parents used more pressure to eat toward their lighter weight child relative to the heavier weight sibling (Berge, Tate, et al., 2016; Harris et al., 2016; Keller et al., 2006; Selzam et al., 2018; Tripicchio et al., 2014). Similarly, parents used more pressure toward the sibling with a lower inherited susceptibility to a higher BMI (defined by a lower BMI genome-wide polygenic score) (Selzam et al., 2018). In one study, however, the use of differential pressure to eat was only evident in siblings who were discordant on weight status (healthy weight vs. overweight) (Berge, Tate, et al., 2016) and in three studies, no differences in parental pressure to eat were reported despite differences in sibling weight (Berge, Meyer, et al., 2016; Roemmich et al., 2010; Ufholz et al., 2020).

In terms of behavioural traits, there was evidence in three studies of parents adapting their use of pressure to eat for siblings in response to differences in their eating behaviours (Farrow et al., 2009; Harris et al., 2016; Roemmich et al., 2010). However, there was no evidence of significant associations with differences in sibling temperament in the one study that examined this trait (Horn et al., 2011). In 2- to 9-year-old siblings, Farrow et al. (2009) found that parents tended to use more pressure toward the sibling that demonstrated more food avoidant behaviours, such as satiety responsiveness, slowness in eating, food fussiness, and emotional undereating, and fewer food approach behaviours, such as food responsiveness and enjoyment of food. Similarly, Harris et al. (2016) found that parents tended to use more pressure to eat toward the twin that they perceived as fussier with food. However, non-significant associations were found between differential pressure to eat and differences in desire to drink and emotional overeating in siblings (Farrow et al., 2009). Similarly, non-significant associations were found based on differences in percentage energy compensation index

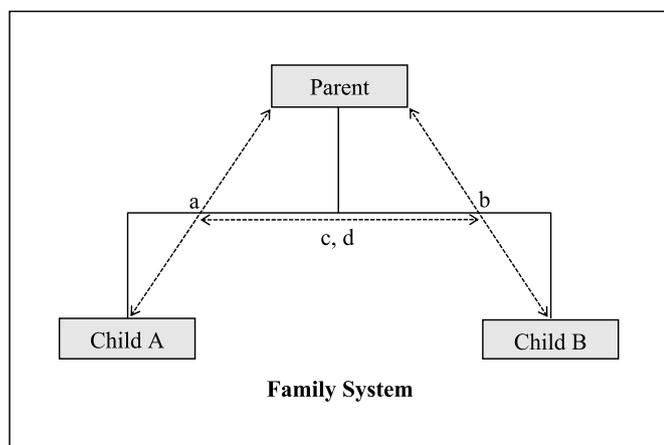


Fig. 2. Conceptual model summarising similarities and differences in parent feeding practices and styles for siblings from included studies ($n = 18$)

^{a,b} Transactional feeding relationships in which parents may adapt their practices in response to the individual characteristics of their children, including weight status, eating behaviours, food preferences, temperament traits, age, birth order, and/or sex, and through which parents may also apply practices consistently across children due to their independent attitudes, knowledge, and skills in relation to feeding, or other household contextual factors that are not unique to each child.

^c Processes driving differences in feeding practices or styles between siblings (e.g., recognising the relative differences in individual personalities or preferences of siblings, attempting to create a calmer mealtime environment, experiencing the novelty of the first-born child).

^d Processes driving similarities in feeding practices or styles for siblings (e.g., intending to treat siblings equally, attempting to avoid conflict with siblings, accommodating the changing food preferences and schedule of the older sibling).

scores and energy intakes during laboratory mealtimes in 4- to 8-year-old twins ($n = 64$ pairs) (Tripicchio et al., 2014) and 8- to 17-year-old brothers ($n = 19$ pairs) (Roemmich et al., 2010), respectively, using parent-reported data. Despite this, in the latter sample, the siblings who reported more pressure to eat from their parents tended to eat less at mealtimes relative to their sibling (Roemmich et al., 2010).

Only two studies explored the use of differential pressure to eat in relation to differences in the sex and birth order of siblings. Berge, Meyer, et al. (2016) and Pulley et al. (2014) both found no differences in parental use of pressure to eat for opposite-sex siblings. However, in 6- to 12-year-old siblings, Pulley et al. (2014) found that parents reported using more pressure to eat toward their younger child, relative to the older sibling. Conflicting with this finding were data from child reports of parent feeding practices, with older male siblings reporting the highest levels of pressure to eat from their fathers (Pulley et al., 2014).

3.3.1.1.3. Instrumental feeding

The use of instrumental feeding with siblings was examined in two studies (Berge, Tate, et al., 2016; Harris et al., 2016). Berge, Tate, et al. (2016) and Harris et al. (2016) both found that differences in the use of instrumental feeding were not related to differences in sibling weight. However, Harris et al. (2016) found that parents tended to offer more food rewards to the child that was fussier with food at 16 months relative to their twin, most likely as a strategy to counter food refusal.

3.3.1.1.1.4. Emotional feeding

The use of emotional feeding was examined in only one study with 6- to 12-year-old siblings (Berge, Tate, et al., 2016). This study found non-significant associations between differences in the use of emotional feeding in parents and differences in the weight of siblings. Thus, findings on the use of differential emotional feeding practices are limited.

3.3.1.1.2. Structure

3.3.1.1.2.1. Monitoring

Monitoring practices appear to be used consistently across the

household, rather than being directed toward one sibling. The three studies that measured sibling resemblance in relation to parental monitoring practices all found significant intraclass correlation coefficients ranging from 0.40 to 0.99 (Farrow et al., 2009; Keller et al., 2006; Roemmich et al., 2010). While one study with 8- to 17-year-old male siblings found that parents tended to monitor the intake of their heavier weight child relative to the lighter weight sibling (Roemmich et al., 2010), a further two studies showed non-significant results (Berge, Tate, et al., 2016; Tripicchio et al., 2014). Parents also monitored siblings' intake similarly despite differences in their eating behaviours (Farrow et al., 2009) and temperament traits (Horn et al., 2011) as reported by parents; energy intakes (Roemmich et al., 2010) and percentage energy compensation index scores (Tripicchio et al., 2014) as measured during laboratory mealtimes; as well as their sex and birth order (Pulley et al., 2014).

3.3.1.1.3. Autonomy support and promotion

3.3.1.1.3.1. Encouragement to eat

Only one study tested differences in the use of encouragement to eat between siblings. In 6- to 12-year-old siblings, Berge, Tate, et al. (2016) found that parents tended to use more encouragement to eat toward their lighter weight child relative to the heavier weight sibling. While this association replicates findings relating to the use of pressure to eat, current evidence is limited.

3.3.1.2. Feeding styles

3.3.1.2.1. Maladaptive feeding (authoritarian and permissive). In a study of 4- to 12-year-old siblings ($n = 36$ pairs), Moens et al. (2013) tested the degree of sibling resemblance on maternal feeding styles (using intraclass correlation coefficients) and examined how differences between siblings were correlated with differences in their age, weight status, and eating behaviours. Eating behaviours included tendencies to exhibit emotional, external, and restrained eating, which were measured based on maternal reports using the Dutch Eating Behaviour Questionnaire (DEBQ) (van Strien & Oosterveld, 2008). In addition, differences in feeding styles were examined in relation to differences in the amount consumed by siblings during a single laboratory mealtime (Moens et al., 2013).

There was some degree of sibling resemblance associated with maternal use of authoritarian ($r = 0.58$) and permissive ($r = 0.75$) feeding styles (Moens et al., 2013). Mothers in the sample used a more authoritarian feeding style for the sibling who was younger, exhibited a less restrained eating style (defined as a lower tendency to deliberately restrict food intake to lose or maintain body weight), and ate more during the mealtime (Moens et al., 2013). In contrast, mothers tended to use a more permissive feeding style toward the sibling who was older, exhibited a more restrained eating style, ate less during the mealtime, and had a higher adjusted BMI (Moens et al., 2013). However, the latter finding did not reach significance in a small subsample of siblings discordant on weight status ($n = 10$ pairs) (Moens et al., 2013).

3.3.1.2.2. Adaptive feeding (authoritative and involved). Statistically significant sibling resemblance was also found for adaptive feeding styles, including authoritative ($r = 0.53$) and involved ($r = 0.51$) feeding (Moens et al., 2013). Mothers tended to show more expressions of involvement during mealtimes with their younger child compared to the older sibling (Moens et al., 2013). Similarly, higher levels of maternal involvement during mealtimes were observed for the sibling who ate more (Moens et al., 2013). In the subsample of weight discordant siblings ($n = 10$), higher levels of involvement were observed for the non-overweight sibling compared to the overweight sibling (Moens et al., 2013). However, the association between differences in maternal involvement and differences in sibling weight was non-significant when examined across the whole sample. No other differences were observed in the extent to which mothers were involved in the mealtime, or in the extent to which they used an authoritative feeding style (Moens et al., 2013).

Table 4
Summary of sibling-related variables analysed in relation to parent feeding practices and styles in quantitative studies ($n = 14$).

	Citation	Continuous measure	Sibling-related variables				Data collection method
			Variable(s)	Continuous measure	Categorical measure		
					Categories	Classification	
Feeding practices							
<i>Coercive control</i>							
Restriction	Keller et al. (2006)	CFQ	Weight	BMIz	–	–	Measured during laboratory visit
	Farrow et al. (2009)	CFQ	Eating behaviours	CEBQ	–	–	Reported by parents
	Roemmich et al. (2010)	CFQ; KCFQ	Weight	BMIz	–	–	Measured during laboratory visit
			Energy intake	Total kilocalories consumed	–	–	Measured following provision of a single food during laboratory visit
	Payne et al. (2011)	CFQ	Weight	BMI percentiles	–	–	Measured during laboratory visit
	Horn et al. (2011)	CFQ	Temperament traits	BSQ, MCTQ	–	–	Reported by parents
	Tripicchio et al. (2014)	CFQ	Weight	BMI, BMIz, WC, BF%	–	–	Measured during laboratory visit
			Energy compensation	COMPX%	–	–	Measured following provision of a carbohydrate drink preload and multi-item lunch meal during two laboratory visits
	Pulley et al. (2014)	CFQ; CFQC	Birth order	–	Older; younger	–	Reported by parents
	Berge, Tate, et al. (2016)	CFQ	Sex	–	Male; female	–	Reported by parents
			Weight	BMI percentiles	Healthy weight; overweight	≥85th BMI percentile (overweight)	Measured during home visit
	Berge, Meyer, et al. (2016)	CFQ (revised version)	Weight	–	Non-overweight; overweight	≥85th BMI percentile (overweight)	NR
	Harris et al. (2016)	Poppets questionnaire	Sex	–	Male; female	–	NR
Food fussiness			CEBQ	Non-fussy eater; fussy eater	≥0.50 CEBQ score relative to that of twin (fussy eater)	Reported by parents	
Selzam et al. (2018)	CFQ	Weight	BMI SDS	–	–	Obtained mostly through child health records	
		Genetic propensity to obesity	BMI GPS	–	–	Reported by parents	
Ufholz et al. (2020)	KCFQ	Weight	BMIz	Non-overweight; overweight	≥85th BMI percentile (overweight)	Measured using two different genotyping platforms	
Control	Saelens et al. (2000)	CFQ (early version)	Weight ^a	–	–	–	
	Berge, Tate, et al. (2016)	PFSQ (select items)	Weight	BMI percentiles	Healthy weight; overweight	≥85th BMI percentile (obese)	Measured during home visit
Pressure to eat	Keller et al. (2006)	CFQ	Weight	BMIz	–	–	Measured during laboratory visit
	Farrow et al. (2009)	CFQ	Eating behaviours	CEBQ	–	–	Reported by parents
	Roemmich et al. (2010)	CFQ; KCFQ	Weight	BMIz	–	–	Measured during laboratory visit
			Energy intake	Total kilocalories consumed	–	–	Measured following provision of a single food during laboratory visit
	Horn et al. (2011)	CFQ	Temperament traits	BSQ, MCTQ	–	–	Reported by parents
	Tripicchio et al. (2014)	CFQ	Weight	BMI, BMIz, WC, BF%	–	–	Measured during laboratory visit
			Energy compensation	COMPX%	–	–	Measured following provision of a carbohydrate drink preload and multi-item lunch meal during two laboratory visits
	Pulley et al. (2014)	CFQ; CFQC	Birth order	–	Older; younger	–	Reported by parents
	Berge, Tate, et al. (2016)	CFQ	Sex	–	Male; female	–	Reported by parents
			Weight	BMI percentiles	Healthy weight; overweight	≥85th BMI percentile (overweight)	Measured during home visit

(continued on next page)

Table 4 (continued)

	Citation	Continuous measure	Sibling-related variables				Data collection method
			Variable(s)	Continuous measure	Categorical measure		
					Categories	Classification	
Instrumental feeding	Berge, Meyer, et al. (2016)	CFQ (revised version)	Weight	–	Non-overweight; overweight	≥85th BMI percentile (overweight)	NR
	Harris et al. (2016)	CFQ	Sex	–	Male; female	–	NR
			Food fussiness	CEBQ	Non-fussy eater; fussy eater	≥0.50 CEBQ score relative to that of twin (fussy eater)	Reported by parents
	Selzam et al. (2018)	CFQ	Weight	Weight SDS	–	–	Obtained mostly through child health records
			Genetic propensity to obesity	BMI SDS BMI GPS	–	–	Reported by parents Measured using two different genotyping platforms
	Ufholz et al., 2020	KCFQ	Weight	BMIz	Non-overweight; overweight	≥85th BMI percentile (overweight)	Measured during laboratory visit
Berge, Tate, et al. (2016)	PFSQ (select items)	Weight	BMI percentile	Healthy weight; overweight	≥85th BMI percentile (overweight)	Measured during home visit	
		Food fussiness	CEBQ	Non-fussy eater; fussy eater	≥0.50 CEBQ score relative to that of twin (fussy eater)	Reported by parents	
Emotional feeding	Berge, Tate, et al. (2016)	PFSQ (select items)	Weight	Weight SDS	–	–	Obtained mostly through child health records
			Weight	BMIz	Healthy weight; overweight	≥85th BMI percentile (overweight)	Measured during home visit
Structure Monitoring	Keller et al. (2006)	CFQ	Weight	BMIz	–	–	Measured during laboratory visit
	Farrow et al. (2009)	CFQ	Eating behaviours	CEBQ	–	–	Reported by parents
	Roemmich et al. (2010)	CFQ	Weight	BMIz	–	–	Measured during laboratory visit
			Energy intake	Total calories consumed	–	–	Measured following provision of a single food during laboratory visit
	Horn et al. (2011)	CFQ	Temperament traits	BSQ, MCTQ	–	–	Reported by parents
	Tripicchio et al. (2014)	CFQ	Weight	BMI, BMIz, WC, BF%	–	–	Measured during laboratory visit
			Energy compensation	COMPX%	–	–	Measured following provision of a carbohydrate drink preload and multi-item lunch meal during two laboratory visits
Pulley et al. (2014)	CFQ; CFQC	Birth order	–	Older; younger	–	Reported by parents	
Berge, Tate, et al. (2016)	CFQ	Sex	–	Male; female	–	Reported by parents	
		Weight	BMI percentile	Healthy weight; overweight	≥85th BMI percentile (overweight)	Measured during home visit	
<i>Autonomy support or promotion</i>							
Encouragement to eat	Berge, Tate, et al. (2016)	CFQ	Weight	BMI percentile	Healthy weight; overweight	≥85th BMI percentile (overweight)	Measured during home visit
<i>Feeding styles</i>							
Authoritarian, permissive, authoritative, and involved feeding	Moens et al. (2013)	MICS (revised version)	Weight	Adjusted BMI	Non-overweight; overweight	120% adjusted BMI (overweight)	Measured during laboratory visit
			Eating behaviours	DEBQ	–	–	Reported by parents
			Food intake	Total weight (grams) consumed	–	–	Measured following provision of a dinner meal during laboratory visit
			Age	Age (years)	–	–	Reported by parents

BF%, body fat percentage; BMI, body mass index; BMI GPS, body mass index genome-wide polygenic score; BMIz, body mass index z-score; BSQ, Behavioural Style Questionnaire; COMPX%, energy compensation index; CEBQ, Children's Eating Behaviour Questionnaire; CFQ; Child Feeding Questionnaire; CFQC; Child Feeding Questionnaire for Children; DEBQ, Dutch Eating Behaviour Questionnaire; KCFQ, Kid's Child Feeding Questionnaire; MCTQ, Middle Childhood Temperament Questionnaire; MICS, Mealtime Family Interaction Coding System; NR; not reported; PFSQ; Parental Feeding Style Questionnaire; WC, waist circumference; SDS, standard deviation score.

^a Siblings discordant on weight status (i.e. 'non-obese' and 'obese') but weight status not included as a variable within the analyses.

3.3.2. Qualitative studies

Of the 18 studies included in this review, 4 used qualitative designs to explore feeding in the context of siblings. Data were collected through semi-structured interviews with parents ($n = 3$) (Berge, Trofholz, et al., 2016; Damen et al., 2020; Webber, Cooke, & Wardle, 2010), or through a combination of semi-structured interviews and ethnographic mealtime observations over 8 days ($n = 1$) (Bosk, 1988). Parents reported adapting certain feeding practices and styles for siblings in response to differences in their characteristics (Supplementary Table 7). For example, in parents of 6- to 12-year-old siblings ($n = 88$ pairs), over half the sample stated that they approached feeding differently with each sibling (Berge, Trofholz, et al., 2016). Similarly, parents of 2- to 3-year-old siblings ($n = 17$ pairs) (Damen et al., 2020) and 6- to 15-year-old siblings ($n = 12$ pairs) (Webber et al., 2010) all indicated differences, albeit sometimes subtle, in their approach to feeding. Consistent with findings from the quantitative studies, some parents reported using more restriction for the sibling who had a higher relative weight status or who was more responsive to food, while using more pressure or encouragement to eat for the sibling who had a lower relative weight status or who was more avoidant of food (Berge, Trofholz, et al., 2016; Webber et al., 2010). Differences in the selection or portioning of foods between siblings were also reported in response to differences in sibling food preferences (Berge, Trofholz, et al., 2016; Webber et al., 2010), birth order (Damen et al., 2020), and weight status (Bosk, 1988). For example, some parents reported serving smaller portions to the younger sibling (Damen et al., 2020), while others were observed serving larger portions to the overweight sibling (Bosk, 1988). In addition, differences in the degree of parental involvement at mealtimes were observed in a small sample of 7- to 11-year-old female siblings ($n = 5$ pairs) discordant on weight status (Bosk, 1988).

However, some parents also reported approaching feeding similarly with siblings (Supplementary Table 7). Berge, Trofholz, et al. (2016), for example, found that almost half their sample reported using consistent feeding practices for siblings ($n = 88$ pairs). When exploring perceived causes of differences in sibling eating behaviours among mothers, Webber et al. (2010) further found that mothers tended to attribute child-related differences to factors that were beyond their control, such as genetics, with the perception that their own behaviours remained relatively consistent. For example, some parents expressed reluctance to prepare different foods for siblings (Berge, Trofholz, et al., 2016; Webber et al., 2010), while others were observed serving similar portions to siblings (Bosk, 1988) despite differences in their food preferences and weight status, respectively.

The qualitative studies further elucidate how parents may rationalise their approach to feeding siblings similarly or differently. For example, parents may alter their feeding practices for siblings in recognition of their individual personalities or food preferences (Berge, Trofholz, et al., 2016), out of concern for the weight status or dietary intake of one child (Berge, Trofholz, et al., 2016; Bosk, 1988), to create a calmer mealtime environment (Webber et al., 2010), or due to changes in their approach to parenting over time following the novelty of the first-born child (Damen et al., 2020). In contrast, the use of consistent feeding practices for siblings were justified by parents through their intentions to treat siblings equally and avoid generating conflict between them (Damen et al., 2020), in addition to their attempts to emphasise the family as a unit and avoid stereotyping or upsetting one particular child (Berge, Trofholz, et al., 2016). Parents also acknowledge that siblings often request or reject similar foods (Berge, Trofholz, et al., 2016; Damen et al., 2020), and that there is a need to accommodate the changing food preferences and schedules of the first-born sibling as they begin to attend childcare or school (Damen et al., 2020). Particularly when siblings are close in age, parents may also perceive it as unnecessary to offer them different foods (Damen et al., 2020). Additionally, parents identify that similarities in their feeding practices for siblings stem from their learnt experiences, such as realising that a certain strategy is effective for the first-born child and then applying it to subsequent children (Berge,

Trofholz, et al., 2016; Damen et al., 2020).

In several studies, parents further acknowledged the evolving realities of mealtimes with multiple children. Parents in one study perceived mealtimes to be more chaotic, with the presence of a second-born child requiring them to divide their time and attention between the siblings (Damen et al., 2020). In a different study, parents also discussed having predetermined expectations for their second-born child, based on their first-born child, which were not always met (Webber et al., 2010). Processes of comparison were also evident in several studies, with parents tending to distinguish between siblings based on characteristics, such as their weight, body size, food preferences, appetites, and response to different feeding practices (Berge, Trofholz, et al., 2016; Bosk, 1988; Webber et al., 2010).

4. Discussion

4.1. Synthesis of evidence

This is the first review to explore the extent and nature of the current literature examining feeding in the context of siblings. Sibling designs offer an opportunity for researchers to delve into the complexities of feeding multiple children within the same family unit. Additionally, twin designs provide a natural experimental control for factors shared by siblings, such as maternal age, weight, and ethnicity, in addition to at least half of their genome (Donovan & Susser, 2011). A total of 18 studies (14 quantitative and 4 qualitative) were included in this review, with the majority focusing on school-aged children from primarily white, middle-class families in North America and Europe.

In examining parent feeding practices and styles, the studies rely predominantly on self-reported data. Two studies used mealtime observations to explore these behaviours, one of which was undertaken in domiciliary settings (Bosk, 1988), while the other was undertaken in a laboratory setting (Moens et al., 2013). Due to participants potentially altering their behaviours in unfamiliar environments, the latter may limit the external validity of the findings (Pesch & Lumeng, 2017). The quantitative studies focused primarily on parental use of restriction, pressure to eat, and monitoring practices as measured using the CFQ (Birch et al., 2001). While the application of this tool enhances comparability among the studies, there are inherent limitations in its use. The restriction subscale of the CFQ, for example, does not distinguish between overt and covert feeding practices which are theorised to have opposing effects on children's preoccupation with and intake of certain foods (Ogden, Reynolds, & Smith, 2006). It is also limited in that it measures the restriction of certain types of foods (i.e., discretionary foods), rather than portion sizes. Items such as "I offer my child her/his favourite food in exchange for good behaviour" are also included, which allude to use of food-based incentives or rewards for children (i.e., instrumental feeding), rather than restriction of their access to food. The phrasing of items within the CFQ also differ across subscales, which may have impacted results. Items within the restriction subscale, for example, are likely to assess parents' attitudes and responses to specific children (e.g., "If I did not guide or regulate my child's eating, he/she would eat too much of his/her favourite foods). In contrast, items in the monitoring subscale are more focused on the parents' own behaviour than on their response to each of their children's behaviours (e.g., "How much do you keep track of the sweets that your child eats?"). In addition, several studies used variations of or alternatives to the CFQ, which may have contributed to inconsistencies in the findings. For example, in studies that included reports from both parents and children, a degree of disparity was evident between their perceptions of feeding practices (Pulley et al., 2014; Roemmich et al., 2010), highlighting the need for further observational data. These limitations also hinder the capacity to draw comparisons between the studies.

Different analytical methods were also employed amongst the studies to assess within-family differences in parent feeding practices and styles. Several studies used intraclass correlations, which estimate

the proportion of total variance in feeding practices or styles across the sample that can be explained by between-family variance, and are equal to the sibling correlation in these variables (Breen & Ermisch, 2021). In most studies, coefficients were significant and ranged from 0.40 to 0.99, indicating a varying degree of sibling correlation. However, intraclass correlation is limited in that it only describes variation in feeding practices within versus between families, rather than assessing how feeding differences relate to individual characteristics of or outcomes in siblings. Hence, other analytical methods were employed. Paired *t*-tests, for example, were used to compare feeding practices or styles between discordant sibling pairs (Berge, Meyer, et al., 2016; Farrow et al., 2009; Harris et al., 2016; Moens et al., 2013; Ufholz et al., 2020), while analysis of variance was used to draw comparisons between reports by mothers, fathers, and siblings (Pulley et al., 2014). Operating on difference scores calculated between sibling pairs, studies also performed Pearson's correlations (Farrow et al., 2009; Harris et al., 2016; Horn et al., 2011; Keller et al., 2006; Moens et al., 2013; Payne et al., 2011), partial correlations (Tripicchio et al., 2014), and multiple linear regression models (Berge, Tate, et al., 2016; Harris et al., 2016; Roemmich et al., 2010; Selzam et al., 2018; Ufholz et al., 2020). A predominant focus within the included studies was on weight in children, with several studies conducted on samples of discordant weight status siblings. Discordance in weight status was either specified as a criterion during recruitment (Bosk, 1988; Roemmich et al., 2010; Saelens et al., 2000; Ufholz et al., 2020) or identified during data analysis (Berge, Meyer, et al., 2016; Berge, Tate, et al., 2016; Moens et al., 2013). In a small number of studies, differences in other characteristics, including eating behaviours (Farrow et al., 2009; Harris et al., 2016; Moens et al., 2013), food consumption (Moens et al., 2013), energy intake or compensation ability (Roemmich et al., 2010; Tripicchio et al., 2014), temperament traits (Horn et al., 2011), age (Moens et al., 2013), birth order (Berge, Meyer, et al., 2016; Pulley et al., 2014), and sex (Berge, Meyer, et al., 2016; Pulley et al., 2014) were also examined using various data collection methods. Thus, additional research is needed to explore how differences in these characteristics may relate to differences in parent feeding practices and styles within families.

Findings from the studies were interpreted mostly through a child-responsive model. However, two studies were conceptualised to examine how differences in parent feeding practices contributed to differences in sibling weight status and/or energy intake (Roemmich et al., 2010; Ufholz et al., 2020). While there is limited capacity to infer causation due to the cross-sectional design of the studies, it may be hypothesised that parents are more likely to use different feeding practices or styles with siblings if they are responding to differences in their characteristics (i.e. a child-responsive model). Thus, whilst reliant mostly on parent-reported data from small homogenous samples, the studies provide a novel lens through which existing knowledge of the complex and bidirectional nature of the parent-child feeding relationship may be strengthened.

While certain feeding practices and styles appear to be applied consistently across the household, others may be adapted for each child. For example, findings from several studies indicated that differential restriction may be used by parents, likely with the intention of controlling the weight of their heavier child and limiting access to food for the child with a higher appetite. These relationships replicate findings from the broader parent feeding literature (Fildes, van Jaarsveld, Llewellyn, Wardle, & Fisher, 2015; Shloim, Edelson, Martin, & Hetherington, 2015; Spill et al., 2019), and have the advantage of controlling, to some degree, for unmeasured confounders that could influence outcomes when phenomena are examined between families (Donovan & Susser, 2011). It is evident, however, that parents may be more inclined to use differential restriction if they are more concerned about one child's risk of overweight (Payne et al., 2011), or if one child is overweight while their sibling is within a healthy weight range (Berge, Tate, et al., 2016). It was also demonstrated that parents may differ their use of restriction for siblings in response to differences in their inherited

susceptibility to obesity, as measured based on their BMI genome-wide polygenic scores (Selzam et al., 2018). It is unclear, however, how these scores are correlated with observable measures of sibling weight status or eating behaviours that may have mediated such a response from parents. While BMI genome-wide polygenic scores explain only a small percentage (~2%) of variance in BMI standard deviation scores (Felix et al., 2015), they may be associated with the trajectory of these scores across toddlerhood, childhood, and adolescence (Hardy et al., 2010). Thus, they may capture a prolonged window of variance in BMI standard deviation scores, indicating that differential feeding practices may be driven by a child's emerging weight status or weight-related behaviours throughout their developmental years, rather than at a single point in time.

In the majority of studies that explored the use of differential pressure to eat with siblings, it was also found that parents used more pressure to eat toward the lighter weight child or the child who exhibited more food avoidant behaviours compared to their sibling. These findings were also congruent with associations observed in the broader parent feeding literature (Fildes et al., 2015; Shloim et al., 2015; Spill et al., 2019). Despite this, three of the included studies showed no associations between differences in parental pressure to eat and sibling weight status (Berge, Meyer, et al., 2016; Roemmich et al., 2010; Ufholz et al., 2020). However, these studies were undertaken in comparatively older children (aged 8–18 years). Due to an increase in child autonomy with age, it is plausible that pressure to eat is still exerted but no longer associated with eating behaviours or weight status in older children. Alternatively, parents may use relatively fewer controlling feeding practices in older children compared to younger children. This was evident in one study, with parents directing more pressure to eat toward the younger child compared to their older sibling (Pulley et al., 2014). Thus, differential pressure to eat may be used in an attempt to ensure that lighter weight and more food avoidant siblings consume a sufficient amount and variety of food to facilitate growth and weight gain during early childhood. Despite this, evidence indicates that the use of pressure to eat may be ineffective or counter-productive in influencing child eating behaviours (Fraser, Markides, Barrett, & Laws, 2021).

In contrast to coercive feeding practices that tend to be contingent on the weight status or appetite of siblings, structure-related practices, such as the use of monitoring or food preparation, appear more likely to be used consistently across the household. Adaptive feeding styles, such as the use of authoritative feeding, were also similar when comparing siblings. Reasons cited by parents often related to their intentions of maintaining family functioning or relationships. Despite this, in the context of siblings, research on the use of responsive feeding practices, including structure and autonomy support or promotion, in addition to feeding styles more broadly, is currently scarce.

Overall, findings from the studies may be limited due to the lack of articulation of theoretical frameworks, which can result in relevant constructs not being identified in the data. For example, the implications of differential feeding on family dynamics have not yet been explored, despite being a central component of family systems theory (Broderick, 1993). While differences in feeding may reflect adaptive and sensitive responses to individual characteristics in children, longitudinal research has shown that parental differential treatment may adversely affect parent-child relationships (Jensen & McHale, 2017) and child behavioural adjustment (Buist, Deković, & Prinzie, 2013; Jensen, McHale, & Pond, 2018; Meunier, Boyle, O'Connor, & Jenkins, 2013; Oliver & Pike, 2018). It is postulated that children who receive more criticism or less affection from their parents, whether perceived or in actuality, tend to form "upward comparisons" with their siblings, which may be detrimental to their self-worth (Jensen & McHale, 2017). However, in line with the notion of reciprocal causation, difficult child behaviours may also evoke more differential treatment by parents (Avinun & Knafo, 2014). Contextual risk factors, such as socioeconomic status, marital conflict, and household chaos, have also been implicated in its use within families (Atzaba-Poria & Pike, 2008; Meunier et al., 2013).

Despite potential implications, the use of consistent feeding practices or styles, driven by the intention to promote equality or avoid conflict, may also result in parents being less responsive and flexible to the individual characteristics of children. Therefore, further research should seek to identify the contexts and consequences associated with differential feeding. As underpinned by family systems theory and outlined in a recent publication by Ruggiero et al. (2021), other processes through which siblings influence responsive feeding in families should also be explored, including resource dilution and learnt experience, to further elucidate the complexities in feeding in households with siblings.

4.2. Implications for research and practice

Current research is reliant mostly on cross-sectional, parent-reported studies in small homogenous samples. Thus, in-depth exploration of feeding in the context of siblings should be conducted, capitalising on longitudinal designs and naturalistic observations in ethnically and socioeconomically diverse populations. Current research also focuses primarily on school-aged children. It is therefore necessary to examine feeding practices and styles in younger siblings when parents continue to scaffold their food environment and shape their eating behaviours on a more frequent basis (Bekelman, Bellows, & Johnson, 2017). As parents may still be adapting to rapid development in children and changes to their routine, this period presents as an opportune time to intervene (Damen et al., 2020). Furthermore, it is plausible that parent feeding practices and styles may be adapted based on the developmental stage of children, particularly as they transition rapidly during toddlerhood and early childhood (Anzman, Rollins, & Birch, 2010). Thus, more research is needed to explore how differential feeding is related not only to birth order, but also differences in sibling age, as interactions between parents and siblings who are close in age versus those who are spaced further apart may resemble varied dynamics (McHale et al., 2012). In exploring the implications of differential feeding on family dynamics, it has been found that children may become more sensitive to differential treatment if they tend to be disfavoured by *both* their parents, as opposed to just their mother (Meunier, Bisceglia, & Jenkins, 2012). With majority of studies reliant on self-reported data from mothers, further research is needed to elucidate the complex, dynamic, and interconnected systems in which both parents and their children are situated in the feeding relationship.

Although scarce, findings from the existing literature also allude to potential implications for feeding interventions. For example, it is evident that sibling characteristics may influence how parents navigate feeding within households. Thus, targeting multi-level factors pertaining not only to the parent and child, but also the broader family, will likely have more efficacy, sustainability, and outcome success (Pratt & Skelton, 2018). The studies also provide an evidence base of parents' perceptions of differences between their children. Techniques such as anticipatory guidance and booster messages may therefore have potential in advising first-time parents on what to expect following the birth of subsequent siblings and equipping them with strategies to respond to such differences.

4.3. Strengths and limitations

This review was based on a comprehensive search of six electronic databases, with screening and data extraction undertaken by two independent authors to increase reliability in the outcomes of the review. Due to feasibility constraints, pilot testing of the eligibility criteria was not undertaken; however, all authors were engaged in detailed discussions regarding these criteria prior to screening. It was also specified that to be eligible for inclusion, studies were to include siblings or twins. Therefore, studies that compared non-related children on the basis of birth order or sibship size were excluded but may have provided a different angle through which the effects of siblings on feeding interactions could be examined. While quantitative data were organised

around three higher-order feeding practice constructs and two broad classifications of feeding styles to enhance comparability, the different study designs and methods employed by the studies limited the capacity to draw detailed comparisons between them. Finally, while differences in parent feeding practices and styles tended to be small, the quantitative scales employed were not designed as clinical measures, and therefore, the clinical relevance of the findings could not be assessed.

6. Conclusion

In the included studies, sibling differences in some parent feeding practices and styles, particularly those of a controlling nature, appeared to be related to differences in their characteristics. Despite this, no studies have examined the impact of differential feeding practices on family functioning, or the impact of non-responsive feeding practices in instances when parents attempt to treat children 'fairly'. Other processes through which siblings impact responsive feeding in households, such as resource dilution and learnt experience, are also under-researched. Regardless, the studies provide a novel lens through which feeding interactions between parents and children can be explored as they are influenced by other dyadic relationships within the family system. Future research should examine how feeding is navigated by parents of siblings, including the contexts and consequences of differential feeding, with particular focus on early childhood when obesity preventative interventions may be most effective.

Author contributions

All authors conceptualised and designed the study. SA conducted the systematic search, with all authors contributing to the collection, extraction, and synthesis of data. SA drafted the manuscript and all authors reviewed and approved the final article.

Declaration of competing interest

The authors declare no conflicts of interest.

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Ethical statement

This article reviewed existing literature. It did not involve human or non-human (animal) participants, material, or data. Therefore, obtaining ethical approval was not required for this article.

Data availability statement

The data underlying this scoping review are available within this article, complete with references.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appet.2022.106045>.

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