ORIGINAL ARTICLE

Maternal & Child Nutrition WILEY

A thematic cluster analysis of parents' online discussions about fussy eating

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Abstract

Food fussiness is associated with non-responsive parent feeding practices, such as persuasive and instrumental feeding. Although most children described as 'fussy eaters' are likely exhibiting developmentally typical behaviours, up to half of the parents of children 2–5 years old express concerns. Concern for fussy eating may mediate the use of non-responsive feeding practices and so must be addressed in parent feeding interventions. Therefore, it is critical to better understand parents' concerns and how they may relate to feeding practices. This study aimed to explore how parents' feeding practices and the social cognitive factors that may drive them clustered based on parents' concern for fussy eating. Data were collected from parent discussions of fussy eating on a Reddit forum (80,366 posts). Latent Dirichlet allocation was used to identify discussions of fussy eating. Relevant posts (1542) made by users who identified as a parent of a fussy eater ($n = 630$) underwent qualitative coding and thematic analysis. Five clusters of parents were identified, ranging in size from 53 to 189 users. These were primarily characterised by parents' degree of concern and feeding practices: (1) High concern, nonresponsive; (2) Concerned, nonresponsive; (3) Low concern, responsive; (4) Low concern, mixed strategies; (5) Low concern, indulgent. Parents who used responsive practices tended to be less concerned for fussy eating, have greater trust in their child's ability to self-regulate hunger, have longer-term feeding goals, and exhibit greater ability for personal self-regulation. Future research should further examine how these constructs may be leveraged in parent feeding interventions.

KEYWORDS

child, preschool, cluster analysis, diet, food, and nutrition, feeding-related behaviour, infant, parents, qualitative research

1 | INTRODUCTION

The parent–child feeding relationship is fundamental to early childhood development (Slaughter & Bryant, 2004) and a key influence on young children's diet quality (Savage et al., 2007). Responsive feeding practices—such as parental modelling of healthy eating, repeated exposure to a variety of healthful foods, and participation in family meals—support children's development of healthful food preferences and are associated with positive health outcomes (D. Benton, 2004; Vaughn et al., 2016). In contrast, nonresponsive feeding practices—such as coercive control (e.g., pressuring to eat, using food to reward eating) and unstructured feeding practices (e.g., allowing the child to graze during the day, offering alternatives when children reject foods)—are associated with poor diet quality and health outcomes (Cole et al., 2017; Daniels, 2019; Patel et al., 2020; Vaughn et al., 2016).

Parents who describe their child as a fussy eater (e.g., eating a limited variety or amount of food or having strong food preferences [Dovey et al., 2008; Lafraire et al., 2016; Taylor et al., 2015]) are more likely to use non-responsive feeding practices (K. A. Brown et al., 2008; Gregory et al., 2010; Harris et al., 2018; Holley et al., 2018; Jansen et al., 2017; Kidwell et al., 2018; Mallan et al., 2018; Taylor & Emmett, 2019). Although most children described as 'fussy eaters' by their parents are likely exhibiting developmentally typical eating behaviours (Byrne et al., 2017), fussy eating is a source of stress and concern for up to half of the parents of children 2–5 years old (Boswell et al., 2019; Byrne et al., 2017; Podlesak et al., 2017; Taylor & Emmett, 2019). Given the evidence that concern for fussy eating is a primary mediator of parents' use of non-responsive feeding practices (Boswell et al., 2019; Byrne et al., 2017; Podlesak et al., 2017; Taylor & Emmett, 2019), it is crucial that these concerns be addressed in parent feeding interventions.

Previous research (Elkins & Zickgraf, 2018; Specht et al., 2018; Taylor & Emmett, 2019) has established that parent feeding practices are, in part, driven by social-cognitive factors such as knowledge (e.g., of effective feeding practices, toddler development), beliefs (e.g., in children's ability to self-regulate hunger, self-efficacy), and environment (e.g., mealtime climate), as well as factors related to children's personality, age, gender, and genetics. However, no study has specifically investigated the social cognitive factors related to parents' concerns about fussy eating (Gubbels et al., 2009; Rodenburg et al., 2013). Gaining a better understanding of how parenting feeding practices and their driving factors may cluster among parents depending on their degree of concern for fussy eating could help inform interventions to support responsive feeding practices.

Previous studies using quantitative survey data have examined how parent feeding practices cluster (Gubbels et al., 2009; Rodenburg et al., 2013). Qualitative data can also be used to investigate clustering via thematic cluster analysis , a mixed-methods approach to discovering patterns in qualitative data that can reveal new insights into people's motivations, behaviours, and thoughts as well as the different contexts in which they are embedded (Guest & McLellan, 2003; Henry et al., 2015). Thematic cluster analysis is a multistage analytic method that involves coding qualitative datasets and using those codes as cluster variables. Cluster analysis may

Key points

- Parents using nonresponsive practices to manage fussy eating may have more concerns about fussy eating, less trust in their child's ability to self-regulate hunger, shorter-term feeding goals, and less developed self-regulation skills.
- As most children described as "fussy eaters" are likely exhibiting developmentally typical behaviours, interventions addressing nutrition and feeding practices in early childhood should aim to alleviate parental concern for fussy eating, for example, by helping them recognise developmentally normal eating behaviours.
- Early childhood feeding interventions may also be enhanced by helping parents to develop long-term feeding goals and improved self-regulation skills in the context of their feeding practices.

enhance qualitative research by allowing for the discovery of subgroups within a sample that may have different experiences, beliefs, practices, or attitudes related to various codes (Guest & McLellan, 2003; Henry et al., 2015). However, cluster thematic analysis necessitates a very large qualitative database, for example, one that offers codable data on hundreds of individuals (Henry et al., 2015). A potential source of such very large qualitative datasets is the publicly available database containing users' contributions to Reddit, an internationally popular social media platform (Statistica, 2020), which has been recognised as a valid and powerful source of qualitative data (Moessner et al., 2018; Okon et al., 2019; Pappa et al., 2017; Park & Conway, 2018; Zhan et al., 2017). In addition to providing a dataset large enough to conduct thematic cluster analysis, the anonymity Reddit has been shown to have a disinhibiting effect (Griffiths, 2001), reducing social desirability bias (Hewson et al., 2016) and enabling individuals to better express their 'authentic self' (Tates et al., 2009).

The purpose of this study was to explore how parents' feeding practices and the social cognitive factors that may drive them clustered based on parents' concern for fussy eating.

2 | METHODS

2.1 | Data extraction

This study was deemed exempt by the Deakin University Human Research Ethics Committee. Using methods previously published, Reddit data were collected from the publicly available *Pushshift Reddit* datasets (Baumgartner et al., 2020) hosted on Google Big-Query (Google LLC). Reddit data are organised into 'threads' posted to smaller communities within Reddit, called subreddits, which are each dedicated to a certain topic. Conversational 'threads' contain 'comments' posted by other users. As fussy eating most commonly

presents between the age of 12–24 months and peaks in intensity between 2 and 4 years of age (Carruth et al., 2004; Dovey et al., 2008), the *r/toddlers* subreddit, a forum where parents of children 2–36 months old discuss 'everything about the toddler years, was selected for extraction and analysis. Posts and comments made on the *r/toddlers* subreddit were extracted using Structured Query Language and Python programmes created and executed in Jupyter Notebooks (Kluyver et al., 2016). Although the *r/toddlers* subreddit was created in 2011, the *Pushshift* dataset had incomplete records before 2016; hence, posts and comments made between January 2016 and August 2019 (the most recent posts available) were included. A total of 80,366 posts and comments, representing 5508 conversational threads, were collected (Figure 1).
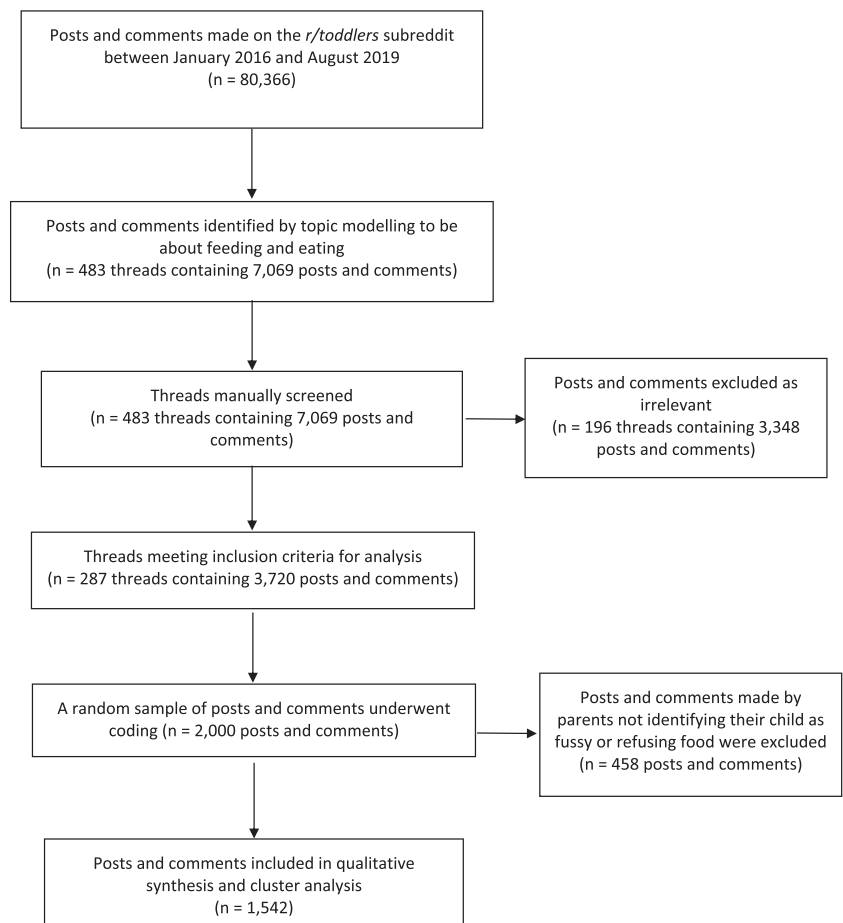
2.2 | Dimensionality reduction technique 1: Topic modelling

Several dimensionality reduction methods were employed to address the challenges inherent to working with large qualitative datasets (Stieglitz et al., 2018). First, topic modelling was used to identify the main topics of Reddit posts and comments (Moessner et al., 2018; Okon et al., 2019; Pappa et al., 2017; Park & Conway, 2018; Zhan et al., 2017). Topic modelling is an unsupervised machine learning technique that detects patterns in the words and phrases within documents to cluster them by

topic (Blei et al., 2003). To prepare data for topic modelling, standard natural language processing techniques were performed using the Natural Language Took Kit (Bird et al., 2009) and Gensim Python libraries (Bird et al., 2009). Topic modelling (latent Dirichlet allocation [LDA]) was performed with the aim of identifying and extracting posts and comments discussing feeding. To determine the optimal number of topics, a series of LDA models were created and their coherence scores (a metric for assessing the quality of an LDA model based on the semantic similarity between words in each topic [Syed & Spruit, 2017]) were examined. A 9-topic model was identified as the optimal model, based on the elbow method (i.e., a model with 10 topics resulted in an only marginal improvement in coherence score) (Syed & Spruit, 2017). The topic model identified 483 threads (containing 7069 posts and comments) as being related to toddler eating and feeding. These were exported to an Excel spreadsheet. Manual examination revealed the topic model included 196 threads (containing 3348 posts and comments) related to oral care and medication, likely due to common keywords (e.g., mouth, swallow). These threads were excluded from further analysis.

2.3 | Coding

The remaining 287 threads (containing 3720 posts and comments) were imported into MAXQDA 2020 (VERBI Software, 2019). First, structural codes informed by previously published conceptual

Posts and comments made on the *r/toddlers* subreddit between January 2016 and August 2019 (n = 80,366)

Posts and comments identified by topic modelling to be about feeding and eating (n = 483 threads containing 7,069 posts and comments)

Threads manually screened (n = 483 threads containing 7,069 posts and comments)

Posts and comments excluded as irrelevant (n = 196 threads containing 3,348 posts and comments)

Threads meeting inclusion criteria for analysis (n = 287 threads containing 3,720 posts and comments)

A random sample of posts and comments underwent coding (n = 2,000 posts and comments)

Posts and comments made by parents not identifying their child as fussy or refusing food were excluded (n = 458 posts and comments)

Posts and comments included in qualitative synthesis and cluster analysis (n = 1,542)

FIGURE 1 Data extraction, topic modelling, screening, and coding performed on posts and comments from the subreddit r/toddlers

frameworks (Elkins & Zickgraf, 2018; Specht et al., 2018; Taylor & Emmett, 2019) were developed, connecting this study to existing theory. As outlined in Appendix 1, structural codes included parent concern for fussy eating, self-efficacy, outcome expectations (e.g., attribution of fussy eating, awareness of effective feeding practices, beliefs about hunger regulation), mealtime environment (e.g. emotional climate), and codes for feeding practices. The parent feeding practice codes were guided by definitions in the literature (Daniels, 2019; Vaughn et al., 2016). Therefore, coercive feeding codes were used for practices attempting to override child satiety cues (i.e., food refusal) by actively encouraging the child to eat more. Examples of coercive feeding codes include verbal or physical persuasion or rules about how much food children must eat before leaving the table. Instrumental feeding was defined as offering children foods as bribes for eating more food or to soothe their emotions or behaviour. Unstructured/indulgent practices provided few limits to what, where, and when meals were served, such as providing alternative foods in response to food refusal or offering only liked foods (i.e., catering), allowing children to graze throughout the day, and children eating separately/apart from family during meals. Structured practices included family meals, regular meal and snack schedules, and offering neutral, repeated exposure to a variety of foods (without pressuring). Finally, statements about promoting children's eating autonomy by allowing them to decide how much or whether they would eat were coded as responsive feeding. Throughout the coding process, codes were developed and refined iteratively using an abductive approach, which involves moving recursively between observations in the data to theoretical generalisation (Tavory & Timmermans, 2014). Additional codes were developed during this process. These included inductive codes that were refined by linking them with existing theory, such as parent agency (attributing their child's eating behaviour and health outcomes to their own efforts rather than to chance or maturation [Hamilton et al., 2014]), and personal self-regulation (controlling their thoughts, emotions, or behaviours to pursue long-term goals [Hamilton et al., 2014]). The final code structure is provided in Table S1.

Coding was first undertaken on a random selection of 2000 posts and comments. Of these, 1542 posts and comments were identified as being made by parents about the food refusal behaviours of their toddlers (n = 630). This sample was deemed to be sufficiently sized to undergo cluster analysis (Henry et al., 2015).

2.4 | Dimensionality reduction technique 2: Cluster analysis

After coding, hierarchical cluster analysis was performed using codes as clustering variables (e.g., codes such as high self-efficacy, low self-regulation, responsive feeding practices) (Plasse et al., 2007). Hierarchical cluster analysis is an agglomerative (i.e. 'bottom up') method of identifying clusters of variables across cases. Each item starts in a cluster of n = 1, and pairs of clusters are merged sequentially. Following the methods specified by Guest

and McLellan (2003), a binary code matrix was extracted from MAXQDA, which showed the distribution of codes across users. Hierarchical clustering of codes across users was implemented with the *fastclust* Python library (Müllner, 2013), specifying a Jaccard index and Ward linkage (Plasse et al., 2007). To determine the optimal number of clusters, the distribution of codes across cluster solutions was examined using crosstabulations of codes for each cluster solution and by referring to the original posts and comments.

2.5 | Thematic analysis

For the thematic analysis of the clusters, a table summarising potentially important themes was developed. Using this structure, B.R.M., in consultation with the other authors, conducted a thematic interpretation of the posts and comments of users in each cluster, identifying the themes within each cluster and comparing them across clusters. This semantic (i.e., descriptive) approach was guided by applied thematic analysis methods (Guest et al., 2011) and a pragmatic framework (Kaushik & Walsh, 2019). To ensure the trustworthiness of findings, the authorship team had frequent meetings to review and discuss themes. In line with a pragmatic approach, the aim of thematic analysis was not to seek an absolute truth but to contribute to existing knowledge bases to benefit society. Further, the authors actively attempted to view the data from many different angles but acknowledge the role their backgrounds, beliefs, and personal experiences had in the construction of the results presented in this paper (Kaushik & Walsh, 2019).

3 | RESULTS

Five clusters were identified, ranging in size from 54 to 189 users (Table 1). Of the five clusters, two were characterised by 'high concern' for fussy eating while the remaining three were characterised by 'low concern' for fussy eating. Six themes were developed: (1) concern for food refusal and feeding strategies to manage food refusal, (2) self-efficacy, (3) agency, (4) self-regulation, (5) parents' feeding goals and (6) parents' knowledge and beliefs The presence and tone of these themes varied between clusters.

3.1 | Concern for food refusal and feeding strategies to manage food refusal

The clearest distinction between clusters involved parents' concern for food refusal and their feeding practices. Parents in Cluster 1 (concerned, nonresponsive, n = 124) and Cluster 2 (concerned, mixed strategies, n = 172) described their child's food refusal as a current, ongoing problem that caused them concern. In Cluster 1 (concerned, nonresponsive), parents described their feeding experiences with the highest degree of concern, frequently citing worries that food refusal

TABLE 1 Clusters identified in the r/Toddlers subreddit discussions of food refusal examined by parent response and parent reflection of child feeding experiences?

Theme	Cluster 1 Concerned, nonresponsive (n = 124)	Cluster 2 Concerned, primarily nonresponsive (n = 172)	Cluster 3 Low concern, primarily responsive (n = 106)	Cluster Low concern, mixed strategies (n = 189)	Cluster Low concern, indulgent (n = 54)
Level of concern	Concerned	Concerned	Low concern	Low concern	Low concern
Feeding strategies	Primarily coercive, indulgent, and instrumental	Primarily indulgent and instrumental with some responsive practices	Primarily responsive with some unstructured and indulgent practices	Described using a wide variety of strategies, including responsive and nonresponsive. Commonly use coercive and instrumental practices	Indulgent (pouches and purees)
Parental self-efficacy	Low	Moderate	High	High	n/a[a]
Parental self-regulation	Low	Low	High	High	n/a[a]
Agency	Moderate	Low	High	High	n/a[a]
Feeding goals	Increase the quality of child's diet Increase amount child eats Avoid mealtime conflict	Increase the quality of child's diet Increase amount child eats Avoid mealtime conflict	Increase the quality of child's diet Help child develop healthy food relationship	Increase the quality of child's diet	n/a[a]
Awareness/beliefs	Responsive practices will not work Distrust in child's ability to regulate intake/hunger Unaware that food refusal is common Strongly believe that food refusal is bad behaviour	Aware that some of their practices were not recommended Do not believe responsive practices will work Uncertain whether food refusal is common Somewhat believe food refusal is bad behaviour	Believe that responsive feeding practices most effective way to feed children Food refusal is common Food refusal is part of the healthy development of independence Trust children to regulate intake/ hunger	Food refusal is normal and common Trust child's hunger and satiety	n/a[a]

[a]Theme not apparent in this cluster.

would cause underweight or malnourishment: 'We're at our wits end trying to fill her up and also worrying about her getting the nutritional requirements she needs (Participant 487)'. This concern may have driven their use of coercive feeding practices, which included descriptions of verbal and physical persuasion. 'I can't get him to try things short of exchanging it for something he wants or shoving some in his mouth (which never ends well obviously) (Participant 54)'. Descriptions of coercive practices were often accompanied by descriptions of mealtime as stressful, frustrating, and a source of conflict with their child. When coercive practices failed, parents fell back on indulgent practices (e.g., offering children their preferred foods, pouches, and/or milk-based supplements, either initially and/or when offered foods were rejected) and instrumental practices (e.g., using food as a reward). In Cluster 2 (concerned, mixed strategies), concerns were presented with milder language and were centred more often around the quality of their child's diet, rather than the quantity of food they ate.

Parents in both Cluster 3 (low concern, responsive, n = 106) and Cluster 4 (low concern, mixed strategies, n = 189) responded to food refusal with low levels of concern; however, differences were observed in the feeding practices parents used in response. In Cluster 3, parents primarily used responsive feeding approaches, whereas parents in Cluster 4 used a wider range of practices and cited nonresponsive feeding practices more frequently. Many parents in Cluster 3 reported that using responsive feeding practices had alleviated their concerns. '[Responsive feeding approaches have] honestly taken all the stress out of feeding her for us and she's gaining along her percentiles perfectly (Participant 509)'. Responsive feeding practices described included adhering to the division of responsibility (parent responsible for what is served and when, while the child is responsible for how much or whether they eat [Satter, 2012]), offering their child a variety of food, repeatedly offering refused foods (without pressure), serving nonpreferred foods alongside at least one liked food, seasoning or preparing foods in a variety of ways, providing nutrition education, and providing exposure to foods outside of meals (e.g., involving children in food planning and preparation, gardening).

Despite the emphasis on responsive feeding practices in Cluster 3, parents also mentioned using some indulgent and unstructured feeding practices, sometimes within conflicting descriptions of their feeding practices. For example, some parents who stated they took responsibility for 'when' their child was fed also described letting their child graze throughout the day or repeatedly offering refused dinner foods throughout the evening. Furthermore, some parents who said explicitly that they did not cater for food likes and dislikes also described using catering practices.

> 'I give my kids the same food we are eating (unless we're eating something super spicy) & I'm fine if they don't finish their dinner, but they know the only food they're allowed to eat after dinner are fruits or yogurt. If they choose to load up on banana & oranges instead of dinner, they can be my guest. (Participant 210)'.

A primary difference in feeding practices between Clusters 3 and 4 was the use of coercive practices, which was a strong theme in Cluster 4 (low concern, mixed strategies) and rarely mentioned by parents in Cluster 3 (low concern, responsive). Parents in Cluster 4 used nonresponsive coercive practices (e.g., verbal pressure, food as a reward) and unstructured practices (e.g., catering) alongside responsive practices (e.g., repeated exposure, involving children in food preparation, family meals and modelling). The mixed approach of responsive and nonresponsive practices gave a sense of inconsistency and contradiction. For example, descriptions of 'bite rules' (coercive rules that children must eat one or more bites before being allowed to decline the food) were often contradictory, with parents acknowledging they could not (or should not) enforce the rules they had set. 'At our table, we have a rule that our three year old has to try everything on her plate. She doesn't have to eat all of it, but she has to at least taste it. This even goes for things that we know she doesn't like.... If she really absolutely refuses to try something we don't push it (Participant 392)'. However, most parents in Cluster 4 were happy with the results of bite rules, which were often used in conjunction with food rewards 'If he tries and doesn't want any more then that's ok. We can negotiate with him more, so we have rules and rewards: finish the (protein) and you can have (banana, orange, cereal, dried fruit). Works great! (Participant 78)'.

Cluster 5 (low concern, indulgent, n = 54) comprised parents who made brief posts with a simple, two-part message: (1) do not be concerned about fussy eating and (2) offer pureed mixtures of fruit and vegetables marketed and sold in plastic 'pouches' (which are instrumental, unstructured practices), 'Almost 14 months here. She's recently decided she LOVES the fruit and veggie pouches. Works for me! I'll keep offering whole fruits and veggies but more often than not, they end up on the floor (Participant 511)'. Although low levels of concern and agency over their child's eating could be inferred by these types of posts, these parents did not offer reflections on their feeding experiences and therefore are not discussed in the following themes.

3.2 | Self-efficacy

Parents in Clusters 1 (concerned, nonresponsive) and 2 (concerned, mixed strategies) had low self-efficacy in feeding their children, describing most of their practices as unsuccessful. For example, parents in Cluster 1 reported that coercive practices often resulted in mealtime conflict and were ultimately believed to be ineffective. 'I tell her she has to try ONE bite and I get a 10 min fight from her every single time which makes me absolutely dread meals. Finally when she takes a bite she says she doesn't like it and will never eat it again. And she won't (Participant 492)'. For some parents in Cluster 1, their inability to influence their child's eating behaviours caused feelings of failure. In Cluster 2 (concerned, nonresponsive), parents appeared to have mixed self-efficacy in their feeding practices, saying that what they were doing worked some of the time.

Although parents in Clusters 3 (low concern, responsive) and 4 (low concern, mixed strategies) were using different feeding practices, parents in both clusters appeared to have high self-efficacy in

feeding. In Cluster 3 (low concern, responsive), parents often stated that their use of responsive feeding was effective in reducing their stress about food refusal and, in some cases, had even led to improvement in their child's fussy eating.

> 'At meal times I realise now how much over the boundaries of the division of responsibilities I have been straying and now I'm trying to stay in my lane. I'm starting to see better results already (Participant 573)'.

3.3 | Self-regulation

Low self-regulation was a theme in Cluster 1 (concerned, nonresponsive) and Cluster 2 (concerned, mixed strategies), with parents stating they had difficulty regulating their emotions and behaviours when confronted with food refusal or when trying to enact new feeding practices. 'I know in my heart that I need to stop making a big deal out of it so there isn't a "fight" in the first place, but I'm struggling with just letting it go. (Participant 112)'. Some parents explained that their difficulty in following through on their feeding intentions was due to feelings of guilt. Other parents revealed they had not succeeded in sticking to their initial ideas in feeding their children.

> 'I had all these expectations of feeding our daughter what we ate… but I was so desperate to get her to eat ANYTHING I started offering oatmeal and cereals, puffs, etc. So now we are stuck (Participant 358)'.

There were some differences in how parents in Clusters 1 and 2 described their self-regulation, with parents in Cluster 2 tending to describe their lack of self-regulation with a greater sense of awareness. 'I know I'm probably stressing about this a bit too much'. In contrast, parents in Clusters 3 (low concern, responsive) and 4 (low concern, mixed strategies) frequently cited self-regulation as an effective tool for managing food refusal.

> 'It's helpful to try to stay nonchalant, too. Even if you have to fake it. If they smell any desperation on your part to make them eat, it can turn into a power struggle, etc… (Participant 14, Cluster 3)'.

3.4 | Agency

Parents in Cluster 1 (concerned, nonresponsive) often asked for advice about how to manage food refusal, belying a belief that there was something they could do to influence their child's behaviour. This suggests that parents in Cluster 1 had some agency in the context of food refusal. Similarly, parents in Clusters 3 (low concern, responsive) and 4 (low concern, mixed strategies) frequently demonstrated that they believed their feeding practices could have some influence on their child's eating behaviours. In contrast, parents in Cluster 2

demonstrated lower agency, often saying they had given up on attempting to influence the types of foods their child ate. For parents in this cluster, the low agency was sometimes offered as an explanation for using indulgent feeding practices and not using coercive practices.

> 'I just make whatever I want for dinner, put some on her plate, and then give her a cheese stick or yogurt if I know I haven't made anything else she likes. I can't help but feel like I've given up a little. (Participant 510)'.

3.5 | Feeding goals

Parents in all clusters cited their desire to improve the quality of their child's diet as well as the quantity they ate as motivation for the feeding practices they used. For parents in Clusters 1 (concerned, nonresponsive) and 2 (concerned, mixed strategies), however, ensuring their child ate enough food—regardless of its nutrient quality—was typically parents' primary feeding goal

> 'By the way, yes we went through all the types of food he would eat. We even tried all the unhealthy food just to find SOMETHING he would enjoy enough to fill his stomach (Participant 93, Cluster 1)'.

Parents in Cluster 3 (low concern, responsive) described additional longer-term feeding goals, such as fostering a positive food relationship. 'You're in charge of what, when, where they eat; they're in charge of how much and whether they eat… At the same time since they have the power to choose to eat or not they develop a positive attitude towards food (Participant 62)'. Cluster 3 parents' desire to help their child have a healthy relationship with food was often cited as a reason for not pressuring children to eat and sometimes connected to parents' own childhood eating experiences. 'This happened to me with fish and I still can't eat it, I really tried but I can't. So I don't force my son to try anything or eat anything (Participant 202)'. Parents in Cluster 3 also cited their own emotional wellbeing as a motivation for using responsive feeding practices. 'I [pressured my child to eat] for a while but 1. It's exhausting and stressful for me 2. I don't want her to have a negative relationship with food (Participant 187)'.

3.6 | Parents' knowledge and beliefs

3.6.1 | Parent beliefs about feeding practices

Although parents in Clusters 1 (concerned, nonresponsive) and 2 (concerned, mixed strategies) often had questions about which feeding practices would be effective, they demonstrated some awareness that nonresponsive feeding practices were not recommended. 'I've tried bribing him with TV (bad, I know). Sometimes that works (Participant 479)'. Parents in Clusters 1 and 2 were also aware that responsive feeding practices were considered by many

to be effective, but they did not believe they would work for their child. The most salient objection to responsive feeding practices involved their distrust in children's ability to eat to their hunger 'I read that book everyone recommends about just providing healthy stuff and they decide when to eat...but he basically chooses to not eat (Participant 179, Cluster 1)'. Other barriers included child tantrums if children were offered nonpreferred foods, time and energy required for responsive practices as well as cost and food wastage when offering a wide variety of food that may be refused.

Parents in Clusters 3 (low concern, responsive) and 4 (low concern, mixed strategies) knew a great deal about responsive feeding, often referencing outputs from Ellyn Satter, a registered dietitian who created the Division of Responsibility in Feeding, a responsive feeding framework (Satter, 2012). Parents in Clusters 3 and 4 strongly believed the Division of Responsibility was the most effective way to feed children. '[Ellyn Satter's books]... completely fixed all our eating struggles. Helps you learn to introduce foods in a stress free way (Participant 330)'. Parents in Cluster 3 often stressed the importance of repeated exposure, and how it can take many exposures for children to learn to like new foods. '... repeated exposure (I've read up to 20+ !) will help her to like foods that she didn't previously like (Participant 62)'. Parents in Cluster 3 also demonstrated knowledge of why the pressure to eat is not effective, referencing children's growing autonomy and independence during toddler years.

3.6.2 | Attributions of fussy eating

Parents in Clusters 1 (concerned, nonresponsive) and 2 (concerned, mixed strategies) often attributed food refusal to children's stubbornness, defiance, or general bad behaviour. 'My son is perfect sweet angel.... except for his endlessly infuriating f*****g pickiness (Participant 360, Cluster 1)'. However, parents in Cluster 2 had a markedly lower degree of emotionality in their posts than parents in Cluster 1, and descriptions of mealtime conflict were milder. Parents in Clusters 1 and 2 often asked for reassurance that they are not alone, suggesting that parents in this cluster may not be aware that food refusal is an expected behaviour among toddlers.

In contrast, parents in Clusters 3 and 4 viewed food refusal as normal, expected behaviour. They believed food refusal could sometimes be attributed to children's healthy growing independence, even while acknowledging it made toddler–parent relations difficult at times. Food refusal was sometimes attributed to sensory characteristics of food, such as texture and colour, by parents in all clusters. Interestingly, few parents mentioned the flavours of food playing a role in food refusal.

3.6.3 | Trust in child's self-regulation of hunger

Parents in Clusters 1 (concerned, nonresponsive) and 2 (concerned, mixed strategies) expressed distrust in their child's ability to eat to

hunger. While discourse on the subreddit was generally supportive and positive, some parents in Cluster 1 became frustrated by suggestions they should trust their child's hunger. 'People who say [children will eat when they are hungry] don't have kids who just aren't ever interested in eating food... Sorry if I sound argumentative, it's just really exasperating hearing that phrase (Participant 321)'. Parents in Cluster 1 also sometimes attributed their children's tantrums to being hungry and not realising it.

In contrast, parents in Clusters 3 and 4 trusted their child's ability to self-regulate food intake. 'When she takes a bite she realises she's too full and doesn't actually want to eat. She's just still figuring out how to listen to her body (Participant 478, Cluster 4)'. Parents in Cluster 3 also expected their child's appetite to fluctuate from day to day, connecting it to the nonlinearity of their child's rate of growth. Parents in Cluster 3 also believed children would likely fill up on their preferred foods if given the opportunity, and hunger was considered to be the 'best seasoning' when offering foods. 'All foods taste better when they are hungry so that is the best time to get him to try (Participant 196)'.

4 | DISCUSSION

In this study, thematic cluster analysis was used to explore how feeding practices and factors are known to influence these practices clustered among parents who perceived their toddlers to be fussy eaters. Five clusters of parents were identified, distinguished mainly by their level of concern and the feeding practices they used. Six themes were developed: (1) concern for food refusal and feeding strategies to manage food refusal, (2) self-efficacy, (3) agency, (4) self-regulation, (5) parents' feeding goals and (6) parents' knowledge and beliefs In line with previous qualitative research, the use of nonresponsive feeding practices co-occurred with themes of low self-efficacy for feeding, attributing fussy eating to behavioural problems or defiance, and distrust in children's hunger regulation (Elkins & Zickgraf, 2018; Specht et al., 2018; Taylor & Emmett, 2019).

Of the five clusters, parents in Clusters 1 (concerned, nonresponsive) and 2 (concerned, mixed strategies) responded to their child's food refusal with the most concern about their toddlers' eating behaviours and primarily relied on the use of non-responsive feeding strategies, while parents in Cluster 3 (low concern, responsive) espoused low levels of concern and primarily used responsive feeding practices. These results are consistent with previous research, which identified parental concern for undereating as an important mediator in the use of coercive feeding practices and using food as a reward (C. L. Brown et al., 2016; Gregory et al., 2010; Haines et al., 2018; Harris et al., 2018). It has been posited that reducing the parental concern for fussy eating, for example, by reassuring parents, it is a normal phase of development, could improve feeding practices. However, to date, studies examining parental concern and their feeding practices have been cross-sectional in nature (C. L. Brown et al., 2016; Gregory et al., 2010; Haines et al., 2018; Harris et al., 2018) and therefore unable to establish temporal order of parents'

concern and feeding practices. In this study, many parents in Cluster 3 described feeling less concern for fussy eating after switching to more responsive practices, suggesting the possibility that using responsive feeding practices may have reduced their concern, rather than reduced concern leading to responsive feeding practices.

Interestingly, the co-occurrence of high-concern and nonresponsive feeding practices observed in Clusters 1 and 2 was not observed among parents in Clusters 4 and 5, with parents describing themselves as unconcerned while also using non-responsive feeding practices. One potential explanation could be found in parents' beliefs about their feeding practices. While parents in Clusters 1 and 2 reported that their non-responsive practices were ineffective (e.g., their children refused to eat as much as the parent wanted regardless of the coercive practices used), Clusters 4 and 5 were relatively satisfied with their feeding outcomes (e.g., coercive or indulgent practices resulted in their child eating more food). The reasons for these differing outcomes likely involve many factors not described by parents in this study, such as toddlers' and parents' personalities and parents' general parenting style and other capabilities (Daniels, 2019). Understanding parents' perceptions of the efficacy of their non-responsive feeding practices are likely to be crucial in informing appropriate strategies for engaging this at-risk group in targeted feeding interventions.

More insight into parents' beliefs about feeding practices may be found in the feeding goals described by parents in this study. Previous research has shown that nonresponsive feeding practices—even if effective in getting children to eat more food in the short-term—can have detrimental effects on children's long-term health outcomes, such as the development of healthy food preferences, and eating autonomy (K. A. Brown et al., 2008; Gregory et al., 2010; Holley et al., 2018; Taylor & Emmett, 2019). It is interesting to note that, while parents in all clusters cited short-term goals, parents in Cluster 3 (low concern, responsive) were the only ones who cited long-term outcomes as feeding goals, such as helping their child foster a healthy relationship with food. To our knowledge, this is the first study to report on the feeding goals of parents concerned for fussy eating. However, our findings align with previous studies not specific to fussy eating, which reported that parents with long-term feeding goals were more likely to use responsive feeding practices as compared with parents with short-term goals (Hoffmann et al., 2016; Moore et al., 2010; Roos et al., 2012; Russell et al., 2015). Future research should investigate the patterns of concern, beliefs about feeding practices and feeding goals observed in this study to see if supporting parents to set long-term feeding goals could reduce concern for fussy eating and the nonresponsive feeding practices such concern mediates (i.e., pressure and rewarding with food).

While some parenting goals are static (e.g., having a happy, healthy child), others are dynamic and can change in response to situational factors such as social setting, their child's behaviour, and their emotional state (Dix, 1992; Hastings & Grusec, 1998). For example, a parent with a long-term goal of helping their child develop healthy food preferences may—in certain social settings or emotional milieu—prioritise a short-term goal, for example, avoiding a temper tantrum and offering their child a food-based reward. In this study,

parents in Cluster 3 (low concern, responsive) frequently cited personal self-regulation as an important strategy for resisting the urge to coerce their child into eating while parents in Clusters 1 and 2 (nonresponsive, concerned) described instances where they were unable to regulate their emotions in response to their child's food refusal. To our knowledge, this is the first study to describe parents' personal self-regulation in the context of children's fussy eating; however, our findings are in line with other research in the parenting domain. For example, a recent study reported that dispositional and situational factors, such as mothers' emotional states and their toddlers' behaviours, increased the odds of prioritising short-term over long-term goals (Lin et al., 2020). Indeed, parent self-regulation is a foundational target of general parenting programmes such as Triple P (Sanders, 1999), Signposts for building better behaviour (Hudson et al., 2003), and ABCD Parenting Adolescents (Burke et al., 2010). Future research should investigate the relationship between parents' self-regulation skills and their child feeding practices to assess its potential as a mediating factor and target for child feeding interventions.

Strengths of this study included the use of a large qualitative dataset, which facilitated the collection of sufficient data to perform a thematic cluster analysis of factors related to food parenting practices. By examining these factors within and between clusters, previously underresearched factors related to feeding practices were explored, such as parental self-regulation and feeding goals. The use of a social media dataset allowed the analysis of parents' unprompted, anonymous discussions on social media as they occurred naturally amongst peers, thereby reducing social desirability bias (Holtz et al., 2012). However, the anonymous nature of the data posed several limitations to the generalisability of this study. First, researchers were unable to ascertain the demographic characteristics of the users. Previous research suggests that Reddit users are predominately male and skew younger than the general population; however, demographic characteristics of users varies between subreddits and no data on the demographic characteristics of parenting forums are available (Sattelberg, 2021). Furthermore, researchers were unable to collect data on important factors known to influence parents' feeding practices, such as cultural and ethnic backgrounds, education, family structure, and socioeconomic status. Finally, researchers were unable to use instruments that collected data on important factors that may influence child eating and parent feedings practices such as child personality, family structure, and general parenting styles. For example, it is unknown if any toddlers discussed in these forums had clinical conditions such as autism spectrum disorders, in whom fussy eating may present more severely (Aponte & Romanczyk, 2016).

Research involving data mined from social media websites should carefully consider ethical considerations to protect participants' privacy. For this study, researchers adhered to guidelines set forth by Benton et al. by submitting the study for review to a university ethics review board, selecting a social media site that promotes anonymity and an open-source, shared database (i.e., Reddit), and decoupling users' posts from their online handles (A. Benton et al., 2017).

5 | CONCLUSION

To our knowledge, this is the first study to explore how feeding practices and factors are known to influence these clusters among a sample of parents who identify their child as a fussy eater. Parents who used responsive practices tended to be less concerned for fussy eating, have greater trust in their child's ability to self-regulate hunger, have longer-term feeding goals, and exhibit a greater ability for personal self-regulation. Future research should examine these constructs to identify how they may relate to each other and to parents' feeding practices to learn how they could be leveraged in parent feeding interventions.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

ETHICS STATEMENT

This study was deemed exempt by the Deakin University Human Research Ethics Committee.

AUTHOR CONTRIBUTIONS

BRM devised the project, collected the dataset, and conducted topic modelling and cluster analyses. BRM coded the dataset and led thematic analysis with input from and collaboration with KJC, RL, KH, RM, and ED-W. BRM wrote the manuscript with support from KJC, KH, RL, RM, and ED-W. All authors discussed the results and contributed to the final manuscript and reviewed and approved the final version.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the Pushshift Reddit Dataset at https://arxiv.org/abs/2001.08435.

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