

## Exploring the role of infant temperament in the relationship between self-feeding and parental responsiveness

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### ABSTRACT

Most international and national feeding recommendations highlight the role of parental responsiveness for shaping infants' self-regulation when feeding and eating, with research suggesting that a more infant-led approach to complementary feeding is associated with greater parental responsiveness. Infant temperament can shape both approach to complementary feeding and parental responsiveness, and may moderate the relationship between them. For example, more surgent infants might initiate more self-feeding attempts which prompt increased parental responsiveness, whereas infants with more negative affect might show more frustration when self-feeding which may increase uncertainty and lower parental responsiveness. However, the role of infant temperament in these interactions has not yet been empirically explored. Furthermore, most research in this area is questionnaire-based. In this study we utilised home-based mealtime observations to examine the relationship between the proportion of infant self-feeding, parental responsiveness and infant temperament. Fifty-one parent-infant dyads (infants aged 6-18 months) were video recorded during typical mealtime interactions, and we coded infant self-feeding and parental responsiveness. Parents also completed questionnaires regarding their infants' temperament. Observed parental responsiveness to infant fullness was positively associated with the proportion of infant self-feeding. Infant surgency was associated with observed parental responsiveness to fullness but no aspects of infant temperament moderated the relationship between self-feeding and responsiveness. These findings suggest that infant temperament and self-feeding are related to parental responsiveness, although the relationship between responsiveness and infant independence during mealtimes may not depend on temperament.

## 1. Introduction

### 1.1. Approaches to complementary feeding

The latest World Health Organization's recommendations on complementary feeding (WHO, 2023) encourage responsive feeding, defined as 'feeding practices that encourage the child to eat autonomously and in response to physiological and developmental needs, which may encourage self-regulation in eating and support cognitive, emotional and social development' (Pérez-Escamilla et al., 2021). Although the WHO does not

recommend a specific complementary feeding method to encourage responsiveness, WHO guidelines encourage infant autonomy during feeding interactions (WHO, 2023). There remains much variability in terms of approach to complementary feeding, both between and within families. Over recent years there has been an increase in families reporting using more infant-led/independent approaches to complementary feeding, popularised for example, as *Baby-led weaning* in the UK (BLW, Rapley & Murkett, 2008) and *Alimentazione complementare a richiesta* (On-demand complementary feeding, Piermarini, 2002) in Italy. Both approaches encourage infant self-feeding from the start of the

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weaning phase (six months of age) with solid foods (ideally family food) instead of purees being offered by parents on a spoon (Cameron et al., 2013). But even within families adopting such approaches there is considerable variability in terms of the regularity of self-feeding and autonomy during eating (Di Prete et al., 2023).

Recent studies have started to explore whether a more autonomous, infant-led approach could confer benefits for infant eating behaviour and development (Addessi et al., 2021; Brown & Lee, 2011; Campeau et al., 2021; Di Santis et al., 2011; Farrow et al., 2024; Pecora et al., 2026; Philippe et al., 2021; Rowan & Harris, 2012; Webber et al., 2021). A more infant-led approach to infant feeding could facilitate infant exploration of food types and textures from an earlier age, enhancing sensory experiences and developing autonomy (Webber et al., 2021). Greater infant independence during feeding and eating will likely support the development of self-regulation in food consumption (Philippe et al., 2021; Rowan & Harris, 2012; Di Santis et al., 2011) and indeed, a more infant-led approach to complementary feeding has been positively associated with participation in family meals (Brown & Lee, 2011), whilst being negatively associated with infant fussiness (Fu et al., 2018). Several studies have also suggested that a more infant-led approach to complementary feeding is associated with better motor and language development (Addessi et al., 2021; Campeau et al., 2021; Farrow et al., 2024; Pecora et al., 2026) with the impact of associated experiences arising from joint interaction and shared family meals appearing to be crucial in facilitating opportunities for development (e.g. Farrow et al., 2024; Webber et al., 2021).

### 1.2. Complementary feeding and parental responsiveness

Emerging research suggests that there may be a positive correlation between parental responsiveness during meals and infant self-feeding (a key characteristic of infant-led feeding approaches) (Di Prete et al., 2023, 2025; Hodges et al., 2013). A responsive caregiver should recognize and respond appropriately to the child's cues, while an unresponsive caregiver is, by definition, more likely to be controlling and forceful in feeding the child if not responding to their cues (Black & Aboud, 2011). Responsive feeding may be more associated with encouraging infants to eat independently by listening to their own physiological needs, therefore promoting self-regulation (Perez-Escamilla et al., 2017) and reducing the risk of under or overweight (Birch & Fisher, 1998). In Brown and Lee (2011), mothers of 6–12-month-old infants following a BLW approach reported (through parent questionnaires) lower levels of restriction and pressure to eat - controlling behaviours which have been associated with lower infant ability to self-regulate energy intake (Benton, 2004; Ventura & Birch, 2008). In a later study (Brown & Lee, 2015) 18–24-month-old infants following a BLW approach were more satiety-responsive (again measured by parental report) and less likely to be overweight in comparison to parent-fed infants. Fernandes et al. (2023) also used a questionnaire study to investigate responsive feeding practices of parents with 3–5-year-old children, finding that parents who had previously used a non-traditional weaning approach (such as BLW) reported less pressure and minimization of children's negative emotions, compared to parents who used a more traditional method focussed on parent-feeding.

Hodges et al. (2013) have been among the few to use an observational measure to evaluate maternal responsiveness during mealtimes. They developed a responsiveness to child feeding cues scale and observed that mothers of self-feeding American infants aged 7–24-month-old were more responsive to infant cues than mothers of parent-fed infants. More recently, using the same coding system, Di Prete et al. (2023, 2025) observed that responsiveness to fullness, but not responsiveness to receptiveness to eat (i. e., how much the caregiver is able to understand that the child is willing to eat and therefore feeds him), was positively associated with the proportion of infant self-feeding (longitudinally in 8-, 12-, 18- and 24-month-old Italian infants). These findings suggests that mothers who allow their infants to self-feed more

often are less likely to keep offering food when their infant show signals of fullness, compared to mothers who follow a more parent-led approach to complementary feeding.

### 1.3. Infant temperament

Parents are responsible for when, what and how the child is fed during early infancy, however genetics and early infant characteristics such as temperament may also influence the feeding practices that parents adopt (Schneider-Worthington et al., 2022). Temperament refers to traits that characterise individual differences in reactivity and self-regulation that are relatively stable over time (Rothbart, 2007). According to Putnam et al. (2014) there are three broad dimensions of infant temperament: surgency (high impulsivity, novelty seeking and activity levels), negative affect (mood instability, anger, dysregulated negative emotions), and orienting/regulatory/effortful control capacity (ability to sustain attention, resist distraction, and refrain from a behaviour). In terms of child eating behaviour, higher levels of child surgency may lead to increased parental responsiveness, as surgent children tend to exhibit a more positive approach to novelty (Vollrath et al., 2012). In contrast, children with higher negative affect are more likely to experience distress in novel or unfamiliar situations, which can manifest as stronger expressions of food fussiness (Helle et al., 2022). This, in turn, may elicit greater parental stress and reduce responsiveness; indeed, negative affectivity has been linked to greater use of non-responsive food parenting practices such as instrumental, emotional and restrictive feeding (Bergmeier et al., 2014; Hughes et al., 2008; Kidwell et al., 2018; Schneider-Worthington et al., 2022). In a cross-sectional questionnaire study, Baker et al. (2023) found that negative affectivity in 2- to 6-year-old children increased parental stress, which reduced parental responsiveness, and led to poorer mealtime quality and structure; moreover, child negative affectivity predicted lower parental responsiveness and higher parental demandingness. Parents may interpret a difficult temperament as fussy eating (rejection of both familiar and unfamiliar foods; Taylor et al., 2015) and rejection of foods may lead to non-responsive feeding practices, such as pressure to eat (Harris et al., 2016). Indeed, Helle et al. (2022) found that a more fussy/difficult infant temperament at 5 months was associated with lower maternal awareness of child hunger and fullness at 2 years (similar cross-sectional findings have been reported by McMeekin et al., 2013). However, it is still unclear whether the relationship between infants' temperament and parents' responsiveness is driven by the infants' ability to communicate their needs effectively, or by the parents' difficulty in interpreting these cues within the context of a difficult temperament profile.

### 1.4. Complementary feeding, parental responsiveness and infant temperament

Brown et al. (2017) speculate that parent of infants with easier temperaments may be more likely to choose a baby-led weaning method, suggesting that fussier infants start the weaning phase earlier because parents are trying to help them to settle (Brown & Rowan, 2016). They suggested that temperament should be considered when exploring infants' eating behaviours, especially in relation to parents' feeding behaviours and control during meals. However, the relation between self-feeding and infant temperament, or between temperament and responsiveness during infant eating interactions, has not been well characterised. It is possible that temperamental traits could influence infant-led feeding and parental responsiveness. Infants with higher surgency may be more curious, expressive and engaged, and therefore elicit more responsive parenting and be more likely to self-feed. In contrast, greater infant negative affectivity may lead to more resistant behaviour or distress, which in turn might result in greater stress and uncertainty for caregivers and therefore less responsiveness and infant-led feeding. Finally high effortful control may facilitate

self-feeding because infants may appear to be more developmentally ready and more likely to persevere with the complex task of self-feeding.

To address these unanswered questions our first aim was to investigate whether the proportion of infant self-feeding is associated with greater caregiver responsiveness to infant hunger and/or fullness, and whether both these aspects are associated with infant temperament during meals. Our second aim was to investigate whether infant temperament moderates the relationship between the proportion of infant self-feeding and parental responsiveness. We assessed temperament by means of a validated questionnaire (Putnam et al., 2014), and we evaluated the proportion of self-feeding and caregiver's responsiveness using independent observations of infants' mealtime interactions.

## 2. Methods

### 2.1. Participants

We utilised data from an observational study of early infant feeding and eating behaviour (described in detail in Farrow et al., 2024). Families were originally recruited to a questionnaire study via Prolific and were subsequently invited to take part in a follow up observational study which involved recording a mealtime observation in their own home. Families were included if they had recorded a mealtime interaction during the first year after the start of complementary feeding (from 6 to 18 months of age) and they had completed questionnaire data as part of the study regarding infant temperament and typical mealtime interactions. In total, 51 caregivers-child dyads were eligible for inclusion.

### 2.2. Procedure

Parents were invited to complete a questionnaire about demographic information, complementary feeding experiences and temperament. Parents autonomously recorded a typical mealtime interaction with their infant, in their home setting to reduce interference and bias. This was used to code for the proportion of self-feeding (which is defined as instances in which the infant put food in her/his own mouth with a spoon, fork, or fingers and swallowed it), parent responsiveness, caregiving behaviour at mealtimes and meal characteristics. Ethical approval for the study was given by Aston University (UREC1605). Each caregiver provided informed consent for themselves and their infants to take part in the study.

### 2.3. Measures

#### 2.3.1. Self-reported measures

**Demographic measures:** Parents provided information about themselves (age, sex, education level, working hours, ethnicity) and about their infant (age, sex, number of siblings, breastfeeding, formula feeding, age of first food, how often the infant eats unaided/eats pureed or mashed food/eats family food/eats as the same time as their family).

**Temperament measure:** Parents also completed the Infant Behavior Questionnaire-Revised Very Short Form (Putnam et al., 2014), a widely validated measure which investigates three measures of infant's temperament (surgency, negative affect, and effortful control). The questionnaire asks parents to rate the frequency of specific temperament-related behaviors observed over the past week with 37 questions on a scale from 1 (never) to 7 (always). This questionnaire was designed for infants aged 3 to 12 months, but we administered it to mothers of older infants (6 to 18 months) as other studies have previously done (Braungart-Rieker et al., 2010; Gartstein & Marmion, 2008). Internal reliability for the negative affectivity measure was strong at  $\alpha = .90$ . However, consistency was moderate for surgency and effortful control, therefore the 'alpha if item deleted' function was used to preserve internal consistency. For surgency items 1 and 13 were removed yielding  $\alpha = .75$ , and for effortful control item 11 was removed, yielding  $\alpha = .85$ . Further details about the reliability of this instrument are

provided in Putnam et al. (2014).

#### 2.3.2. Mealtime observations

Parents were asked to record a typical mealtime interaction with their infant. Parents were given an instruction sheet to guide the observation. This explained that the recording device needed to be positioned so that the infant's face and food were visible but not disturbing to the infant and that the parent/caregiver leading the feeding interaction was also in the recording frame. Observations were used to code for the following:

**Mealtime characteristics:** Observations were coded to characterise the mealtime setting and the infant feeding approach. Specifically, observations were coded for: food type (finger-food, pureed food, mixed food), number of adults present, number of other children present, number of adults eating, number of other children eating, which adult fed the infant, eating location (highchair, parent's lap, floor, chair), and meal duration. Counts were made of number of parent-fed bites and number of self-fed bites during a meal and the proportion of self-feeding was calculated as the number of self-fed bites divided by the number of total bites. These variables have been coded by A.D.P. previously in other studies (Di Prete et al., 2023, 2025).

**Parental responsiveness:** Videos were also coded using the Responsiveness to Child Feeding Cues coding scheme (RCFCS, Hodges et al., 2013) by means of the BORIS software (Friard & Gamba, 2016) to code parental responsiveness to infant receptiveness and fullness cues. The RCFCS coding scheme allows for the scoring of parental responsiveness through microanalytic and global analyses of dyadic transactions during a meal. The phases, cue types and timing of cues coded by the RCFCS are described in the Supplementary Material. Caregiver's responsiveness to hunger/receptiveness is coded separately from caregiver's responsiveness to fullness, reflecting the distinctiveness of hunger and fullness cues and the potential for different levels of sensitivity across the mealtime. This coding scheme considers the presence or absence of 48 different types of feeding cues and their frequency, and the meal is divided in two phases: the hunger phase (from the beginning of the meal until 1 min after the first bite) and the fullness phase (from 1 min after the first bite until the end of the meal). In the hunger phase we can observe 20 cues that are labelled as "hunger cues" when observed during meal preparation or "receptiveness cues" if observed during meal consumption. In the fullness phase we can observe 28 cues that are labelled as "disinterest cues" when observed during the hunger phase or "fullness cues" when observed from 1 min after the first bite until the end of the meal. All indicators are classified into early, active and late cues, according to the temporal sequence and intensity of the cues. Responsiveness to infant hunger/receptiveness to eat is defined by the number and type (early, active, late) of infant's cues observed from the start of food preparation to 1 min after the first bite. Responsiveness to infant fullness is defined by the number and type (early, active, late) of infant's fullness cues produced in the period from 1 min after the first bite to the end of the meal. Because we coded observations made in the home setting, we were unable to code responsiveness to hunger cues as described by Hodges et al. (2013), as coding for hunger occurs from 10 min before the first bite until the infant is placed in the feeding position and/or the parent initiates food preparation. We instead coded responsiveness to receptiveness to eat (which includes receptiveness and disinterest cues). The caregiver's responsiveness was coded separately for infant receptiveness and fullness on a five-point Likert scale, from "highly responsive" (5) to "highly unresponsive" (1). See Supplementary Material for a detailed description of how responsiveness was coded.

The videos were analysed using this coding scheme by A.D.P., who was trained in its use and was certified being an expert coder by the creator of the instrument (Hodges et al., 2013) and has previously used and published with this measure (Di Prete et al., 2023, 2025) reaching a high level of inter-rater reliability.

**Table 1**

Descriptive characteristics of early feeding and eating experiences reported by caregivers, N = 47.

| Diet habits                                                | Frequency                                                                                                                        |                                   |                               |                          |                        |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|--------------------------|------------------------|
| Ever breastfed                                             | Yes: 85.1 %<br>No: 14.9 %                                                                                                        |                                   |                               |                          |                        |
| Ever formula fed                                           | Yes: 57.4 %<br>No: 42.6 %                                                                                                        |                                   |                               |                          |                        |
| Age of first food (months)                                 | 5.60 (0.54)                                                                                                                      |                                   |                               |                          |                        |
| Form of first food                                         | Pureed: 70.2 %<br>Finger-food: 29.8 %                                                                                            |                                   |                               |                          |                        |
| How often the infant eats unaided                          | <b>Always</b><br>8.5 %                                                                                                           | <b>Often</b><br>27.7 %            | <b>Sometimes</b><br>36.2 %    | <b>Rarely</b><br>17.0 %  | <b>Never</b><br>10.6 % |
| How often the infant eats pureed/mashed food               | 14.9 %                                                                                                                           | 34.0 %                            | 27.7 %                        | 21.3 %                   | 2.1 %                  |
| How often the infant eats family food                      | <b>All the time</b><br>42.6 %                                                                                                    | <b>Most of the time</b><br>36.2 % | <b>Occasionally</b><br>12.8 % | <b>Does not</b><br>8.5 % |                        |
| How often the infant eats as the same time as their family | 21.3 %                                                                                                                           | 38.3 %                            | 31.9 %                        | 8.5 %                    |                        |
| <b>Observed meal characteristics</b>                       | <b>Mean (SD) or Frequency</b>                                                                                                    |                                   |                               |                          |                        |
| Food type                                                  | Finger-food: 58.8 %<br>Mix: 33.3 %<br>Pureed food: 7.8 %<br>Highchair: 92.2 %<br>Chair: 3.9 %<br>Floor: 2 %<br>Parent's Lap: 2 % |                                   |                               |                          |                        |
| Eating location                                            | 0.77 (0.34)                                                                                                                      |                                   |                               |                          |                        |
| Proportion of self-feeding                                 | 16.1 (7.27)                                                                                                                      |                                   |                               |                          |                        |
| Meal duration (minutes)                                    |                                                                                                                                  |                                   |                               |                          |                        |

## 2.4. Statistical analyses

Descriptive statistics were computed to characterise the sample. The data was non-normally distributed therefore non-parametric tests were used. Spearman's correlations were used to explore our first aim: whether proportion of self-feeding and responsiveness to receptiveness/fullness were associated, and whether they were both associated with infant temperament. We performed a Wilcoxon signed-ranks tests to determine the difference between parent responsiveness to receptiveness and to fullness. Then, we performed moderation analysis using a multiple linear regression model with interaction terms (Jamovi Med-Mod module) to investigate whether temperament was a moderator of the relation between proportion of self-feeding and parental responsiveness. Statistical analysis was performed using Jamovi (The jamovi project, 2024) and the significance level was set at  $p < .05$ .

## 3. Results

### 3.1. Descriptive statistics

In this cross sectional study caregivers were 70.2 % mothers (remaining were fathers); mean age = 30.9 years (SD = 3.79), mostly of White ethnicity (White 93.6%, Black 2.1%, Indian 2.1%, dual heritage 2.1%), while their infants were 36.2 % girls with a mean age of 13.30 months (SD = 3.82; min-max = 5.4-18.9 months). Caregivers' education post-16 was 5.40 years on average (SD = 2.04) and weekly working hours were 29.8 on average (SD = 15.1). All infants were from the UK, and the study was conducted in the UK.

Descriptive characteristics of early feeding and eating experiences are described in Table 1. According to parental report, the mean age of introducing the first food was 5.6 months (in accordance with the WHO recommendations; WHO, 2023) and most infants (70.2%) started weaning with pureed food (in line with recent UK recommendations on complementary feeding; Reeves, 2018). For current feeding practices, caregivers reported that most infant ate unaided "sometimes", ate pureed food "often", ate family food "all the time", and ate with their family "most of the time".

For mealtime observations, as shown in Table 1, the caregiver was most often the mother, but in 29.8% of observations it was the father. In 72.2% of meals only one adult was present (minimum 1 – maximum 4), and in 96.1 of meals no other children were present (minimum 0 – maximum 1). Infants ate most often finger-foods, in a highchair, and the

average duration of the meal was 16.1 min (min-max = 3–39 min).

As illustrated in Fig. 1, parents were mostly responsive to both receptiveness to eat (94.11%) and fullness (78.45%). Wilcoxon signed-ranks tests ( $z = -3.068$ ,  $p = .002$ ) showed that parents were significantly more responsive to receptiveness than to fullness.

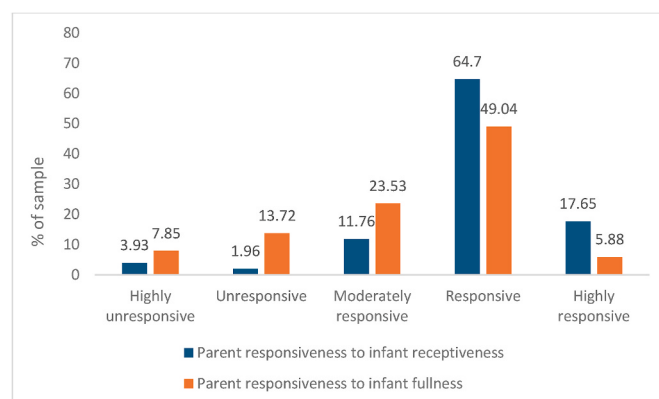
Infant temperament is shown in Table 2. Temperament scores are comparable to those published in other studies (Gartstein & Marmion, 2008; Putnam et al., 2014).

### 3.2. Relationships between self-feeding, responsiveness and temperament

As shown in Table 3, caregiver responsiveness to fullness was positively associated with proportion of self-feeding and the surgency dimension of temperament.

### 3.3. Does temperament moderate the relationship between infant self-feeding and caregiver responsiveness?

Moderation analysis was performed to investigate whether temperament was a moderator of the relationship between the proportion of infant self-feeding and caregiver responsiveness. As shown in Table 4, temperament did not significantly moderate any of the relationships between the infant self-feeding and responsiveness at mealtimes.



**Fig. 1.** Frequency distribution of parent responsiveness to infant receptiveness and fullness.

**Table 2**  
Average scores for temperament (parent-reported).

| Temperament       | Mean (SD)   | Range     |
|-------------------|-------------|-----------|
| Surgency          | 5.18 (0.88) | 2.45–6.50 |
| Negative affect   | 4.02 (1.12) | 1.67–6.08 |
| Effortful control | 5.26 (0.89) | 2.36–6.73 |

**Table 3**  
Spearman's correlation between caregiver responsiveness, infant proportion of self-feeding and infant temperament. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ . Resp. = Responsiveness.

|                |                                  | 1            | 2             | 3    | 4            | 5    |
|----------------|----------------------------------|--------------|---------------|------|--------------|------|
| Responsiveness | 1. Resp. to infant receptiveness |              |               |      |              |      |
|                | 2. Resp. to infant fullness      | <b>0.28*</b> |               |      |              |      |
| Self-feeding   | 3. Proportion of self-feeding    | 0.16         | <b>0.37**</b> |      |              |      |
| Temperament    | 4. Surgency                      | −0.03        | <b>0.30*</b>  | 0.24 |              |      |
|                | 5. Negative affect               | 0.04         | 0.17          | 0.12 | 0.04         |      |
|                | 6. Effortful control             | −0.13        | 0.13          | 0.12 | <b>0.41*</b> | 0.05 |

**Table 4**  
Moderating role of temperament on the relationship between infant self-feeding and caregiver responsiveness to infant receptiveness to eat/fullness. The estimate is a regression unstandardized beta coefficient.

| Responsiveness to receptiveness to eat            | Estimate | SE   | Z     | P           |
|---------------------------------------------------|----------|------|-------|-------------|
| Proportion of self-feeding                        | 0.73     | 0.35 | 2.07  | <b>0.04</b> |
| Surgency                                          | −0.08    | 0.14 | −0.60 | 0.54        |
| Proportion of self-feeding x Surgency             | −0.30    | 0.38 | −0.80 | 0.42        |
| Proportion of self-feeding                        | 0.73     | 0.35 | 2.07  | <b>0.04</b> |
| Negative affectivity                              | −0.01    | 0.10 | −0.08 | 0.93        |
| Proportion of self-feeding x Negative affectivity | −0.05    | 0.40 | −0.13 | 0.90        |
| Proportion of self-feeding                        | 0.76     | 0.35 | 2.20  | <b>0.02</b> |
| Effortful control                                 | −0.13    | 0.13 | −0.10 | 0.32        |
| Proportion of self-feeding x Effortful control    | 0.55     | 0.51 | 1.08  | 0.28        |
| <b>Responsiveness to fullness</b>                 |          |      |       |             |
| Proportion of self-feeding                        | 0.79     | 0.42 | 1.88  | 0.06        |
| Surgency                                          | 0.27     | 0.17 | 1.64  | 0.10        |
| Proportion of self-feeding x Surgency             | −0.23    | 0.45 | −0.52 | 0.60        |
| Proportion of self-feeding                        | 0.84     | 0.42 | 1.99  | <b>0.04</b> |
| Negative affectivity                              | 0.19     | 0.13 | 1.51  | 0.13        |
| Proportion of self-feeding x Negative affectivity | −0.73    | 0.47 | −1.55 | 0.12        |
| Proportion of self-feeding                        | 0.91     | 0.42 | 2.16  | <b>0.03</b> |
| Effortful control                                 | 0.16     | 0.17 | 0.95  | 0.34        |
| Proportion of self-feeding x Effortful control    | −0.67    | 0.62 | −1.08 | 0.28        |

However, the direct effects of proportion of self-feeding were significant or approaching significance (depending on the variable involved).

#### 4. Discussion

The aim of this study was to investigate the relationship between the observed proportion of infant self-feeding and observed caregiver responsiveness to infant receptiveness and fullness cues during meal-times and the potential moderating role of infant temperament in these relationships.

*Proportion of self-feeding and responsiveness:* As seen in previous studies (Hodges et al., 2013; Di Prete et al., 2023, 2025), responsiveness to fullness was positively associated with the proportion of self-feeding,

suggesting that infants who ate more independently had caregivers who were more attentive to their behaviours and needs with potential positive implications for self-regulation. The findings are correlational and whilst infant self-feeding may shape parental responsiveness, it is equally likely that caregivers' responsiveness might facilitate and support more infant self-feeding with caregivers potentially being more engaged and responsive to infant signals of interest to self-feed. Parents were more responsive to infants' receptiveness than fullness cues (similarly to Hodges et al., 2013; Di Prete et al., 2023, 2025). Potentially reflecting a tendency for caregivers to prioritise cues that promote intake over those that signal cessation, which could have important implications for the development of appetite regulation. Alternatively, fullness cues may be more subtle or harder to interpret, leading to reduced caregiver responsiveness in comparison to more overt receptiveness signals. These findings underscore the importance of supporting caregivers in recognising and responding appropriately to both hunger and satiety cues during early feeding interactions.

*Responsiveness and temperament:* The positive correlation between the surgency dimension of temperament and parental responsiveness to fullness is a novel finding, but is consistent with other reports describing children with higher surgency as being more expressive and sociable-traits that may support clearer hunger and fullness signalling, thereby facilitating greater parental understanding and responsiveness (Vollrath et al., 2012). This may indicate that more overt behavioural cues associated with surgency make it easier for caregivers to accurately interpret and respond to satiety signals. Contrary to our hypothesis, no significant correlation was found between the negative affectivity dimension of temperament and parental responsiveness. One possible explanation is that parents of infants with higher negative affectivity may develop strategies to effectively manage their infants' emotional expressions, mitigating any impact on feeding interactions. Alternatively, heightened negative affectivity may introduce ambiguity in interpreting cues, making it more difficult to distinguish between hunger, discomfort, and other sources of distress. Notably, none of the temperamental dimensions moderated the relationship between the proportion of self-feeding and parent responsiveness. This lack of moderation suggests that the association between self-feeding and responsiveness may be relatively robust across different infant temperamental profiles. This suggests that infants who engage more in self-feeding can still experience responsive parenting, regardless of temperament, including those with more challenging behavioural profiles. It is important to consider, however, that our sample size was small, which means we may not have had enough statistical power to detect an effect. Future research with larger and more diverse samples is needed to confirm these findings and explore potential subtle moderating effects of temperament.

Previous studies in this field have largely relied on parent-report measures, as such the observational component of this project is a clear strength. In addition, the use of observations recorded in participant's home rather than a laboratory environment provides greater ecological validity and detailed real-time interaction data, which cannot be captured from questionnaires. Indeed, we see much more variability in terms of the length of interactions and the presence of caregivers in these natural, family recorded observations, compared to those that we observe in the laboratory, suggesting that they reflect better the reality of typical, often chaotic, every-day experiences for families. Study limitations include the small size of the sample (which limits the number of covariates considered and the power adequacy) and the cross-sectional nature of the study, and the fact that we only had one observation for each infant. Meal recordings were mostly of lunches or dinners (64.7%), and it is possible that there could be differences in terms of self-feeding or responsiveness depending on the type of meal which should be accounted for in future research. It is also important to note that we used an adaptation of the Infant Behavior Questionnaire-Revised Very Short Form. While this helped to improve internal consistency, it could cause problems when comparing our results with those of other studies that used the full version. Moreover, only one person coded the videos for

responsiveness although she was trained by the scholar who developed the instrument and had already used it in other studies obtaining a high inter-rater reliability. Finally remote observation could have led to some inaccuracies in accounting for the number of adults and other children present, however the benefits of the mealtime being more natural were a priority in our study.

In conclusion, our findings suggest that early self-feeding is associated with heightened parent responsiveness to fullness, and that this relationship doesn't appear to be moderated by infant temperament. The absence of a moderating effect may indicate that encouraging self-feeding could be beneficial for parent-child mealtime interactions across a range of temperamental profiles and not just in those with "easy" temperamental profiles. These results support the potential value of promoting infants' mealtime independence from an early age. However, further longitudinal studies with larger, more diverse and representative families are needed to confirm these findings and to explore their long-term implications. These findings highlight the importance of promoting infants' independence during meals from an early age and may help inform future interventions aimed at fostering more positive and responsive family mealtime interactions.

### CRediT authorship contribution statement

**Alice Di Prete:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Jacqueline Blissett:** Writing – review & editing, Conceptualization. **Laura Shapiro:** Writing – review & editing, Conceptualization. **Elsa Addressi:** Writing – review & editing, Conceptualization. **Francesca Bellagamba:** Writing – review & editing, Conceptualization. **Rachel Batchelor:** Writing – review & editing, Data curation. **Shefu Islam:** Writing – review & editing, Data curation. **Charlotte Webber:** Writing – review & editing, Data curation. **Claire Farrow:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization.

### Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki, and ethical approval was given by Aston University (UREC1605). Each caregiver provided informed consent for themselves and their children to take part.

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### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appet.2026.108588>.

### Data availability

Data will be made available on request.

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