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THE IMPACT OF ORAL SENSORY PROCESSING DIFFICULTIES ON THE TRANSITION FROM PUREED TO TEXTURED FOODS IN TYPICALLY DEVELOPING CHILDREN UNDER 2 YEARS OF AGE

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Abstract

The transition from pureed to textured foods is a critical developmental milestone in infancy, which requires the integration of oral sensory processing and oral-motor skills.

Hinderances in sensory processing, such as hyperreactivity or reduced sensory differentiation, may interfere with texture acceptance and delay feeding progression. This systematic review examines the impact of oral sensory processing difficulties on the transition to textured foods in typically developing children under two years of age.

A systematic search of studies published from 2015 onwards was conducted, including a variety of study designs. Due to heterogeneity in methods and outcomes, findings were synthesized using a thematic analysis approach. Fifteen studies met the inclusion criteria. Four key themes were identified: sensory hyperreactivity, timing of texture introduction, structured exposure, and measurement gaps, alongside a cross-cutting theme of contextual variability.

Infants with sensory hyperreactivity were more likely to exhibit gagging, food refusal, and prolonged reliance on purees. Delayed introduction of textured foods beyond 9–10 months was associated with increased feeding difficulties and reduced dietary variety. Structured exposure through sensory-motor and responsive feeding interventions improved texture acceptance and feeding behaviors. However, most studies relied on caregiver-reported measures, highlighting a lack of objective sensory assessment tools. Variations in cultural feeding practices and study methodologies further limited generalizability.

Overall, oral sensory processing plays a significant role in early feeding development. Early, appropriately timed exposure to textured foods and targeted interventions may support successful feeding progression, though further research using standardized and objective measures is needed.

INTRODUCTION:

The shift from pureed to textured foods during infancy is a vital developmental step that hinges on how well a baby's oral sensory processing and oral-motor skills are developing. To handle more complex textures successfully, infants need to blend tactile, proprioceptive, and taste signals in their mouths to help them chew, form a bolus, and swallow safe. If sensory processing gets thrown off, like with hypersensitivity, hyposensitivity, or poor

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sensory discrimination - babies might find it hard to handle textured foods, show negative reactions, and fall behind in developing the feeding skills that are typical for their age. These feeding issues not only pose immediate challenges for families but can also lead to long-term problems like dietary restrictions, growth issues, and ongoing picky eating.

Recent studies in paediatric nutrition and neurodevelopment highlight that early exposure to different foods is crucial for developing sensory pathways and oral-motor abilities. Babies with heightened oral sensitivity often gag, feel distressed, or refuse food when faced with textured options, while those with lower sensitivity might chew ineffectively or miss cues about bolus properties that are essential for safe swallowing. These early sensory-motor challenges limit their chances to practice, making them rely more on smooth purees and slowing their progress to more complex textures during a key time for brain development. Research indicates that delaying the introduction of textured foods past 9–10 months can increase the risk of ongoing feeding issues and less dietary variety in later childhood.

In addition, the latest global feeding guidelines emphasize the significance of gradually introducing different food textures. This approach not only helps infants get used to new sensations but also enhances their chewing skills and supports healthy development. When infants face oral sensory challenges that disrupt these guidelines, they might develop problematic feeding habits, struggle during mealtimes, cause stress for caregivers, and face a higher risk of nutritional deficiencies. Even though there's a growing awareness of these challenges, research specifically looking at how oral sensory processing issues affect the transition from purees to textured foods in children under two is still quite scattered across various fields like clinical, developmental, and gastroenterology.

This literature review aims to bring together research from after 2015 to shed light on how oral sensory processing difficulties impact the move to textured foods for infants under two years old. By exploring sensory mechanisms, feeding behaviours, and clinical implications, the review hopes to provide insights for early assessments, guidance for caregivers, and intervention strategies that promote healthy feeding development.

While some studies have looked into feeding difficulties, sensory responsiveness, and texture acceptance, the current literature is still quite fragmented. Most research tends to focus on general feeding issues, timelines for complementary feeding, or oral-motor development, with very few specifically addressing how oral sensory processing difficulties influence the transition from pureed to textured foods in infants under two years old. Additionally, no comprehensive synthesis currently consolidates evidence from the past decade that isolates **non-ASD, sensory-based feeding challenges** in typically developing infants. This creates a gap in understanding the direct sensory mechanisms that delay or disrupt the early progression of texture.

Research Question

How do oral sensory processing difficulties impact the transition from pureed to textured foods in children under 2 years of age?

Research Objectives

1. To identify and summarise studies that examine oral sensory processing difficulties in infants under 2 years.
2. To analyse how sensory hypersensitivity or hyposensitivity affects acceptance of textured foods during complementary feeding.
3. To evaluate the relationship between oral sensory responses (e.g., gagging, refusal, distress) and delays in texture progression.
4. To identify gaps in current evidence and propose implications for early feeding intervention and caregiver guidance.

Therefore, a focused, up-to-date systematic review is needed to:

- Integrate recent evidence (2018–2025) on the interplay between oral sensory processing and texture acceptance in infants.
- Provide clinicians, speech and feeding therapists, and caregivers with clear insights into early sensory barriers that hinder texture progression.

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- Support early identification and intervention for infants struggling with texture transitions due to sensory factors.
- Address an underexplored developmental pathway that has implications for nutrition, growth, feeding independence, and long-term eating behaviours.
- The impact of oral sensory processing challenges on the transition from pureed to textured foods is a crucial concern. Understanding how sensory processing affects food acceptance and using a gradual texture exposure strategy can help caregivers and clinicians support children in developing the necessary oral motor skills and sensory tolerance to navigate the stages of complementary feeding.

The impact of oral sensory processing challenges on the transition from pureed to textured foods is a crucial concern. Understanding how sensory processing affects food acceptance and using a gradual texture exposure strategy can help caregivers and clinicians support children in developing the necessary oral motor skills and sensory tolerance to navigate the stages of complementary feeding. By synthesising available research, this review aims to contribute to clinical practice, inform parent education strategies, and guide future research on infant feeding development.

Conclusion:

Oral sensory processing problems are a main barrier to the process of transitioning purees to textured food in infants. The effects are both short-term feeding patterns and long-term growth and development. Early interventions are important for helping children accept different textures and develop oral motor skills. Specific sensory motor exposure and therapy are key components of this intervention. These early efforts help ensure children grow with a varied and healthy diet. This minimizes the chance of growth retardation and behavioral feeding disorder later in their lives. Systematic intervention in the early stages have a lasting impact on overall health and feeding habits.

Methodology

Study Design

The systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The objective was to synthesize empirical evidence on how oral sensory processing difficulties affect the transition from pureed to textured foods in children under 2 years of age.

Search Strategy

A systematic review needs a detailed yet manageable search of the available resources. Unlike extensive and exhaustive quantitative reviews, the study will focus on qualitative analysis. The search strategy was developed by refining the search strings to maximize sensitivity while maintaining specificity. The search covered publications from January 2018 to December 2025, and was limited to English-language, peer-reviewed empirical studies. Search terms were organised around three core concepts: oral sensory processing, texture progression, and infant/toddler populations. Boolean operators (AND/OR) were used to combine key terms. A structured search strategy was applied across three electronic databases:

1. PubMed (MEDLINE)
2. CINAHL (EBSCOhost)
3. Scopus

Sample Search Strings/ Keywords:

Examples of basic search strings include:

- *"oral sensory processing" AND "texture" AND infant* (PubMed)
- *(oral sensory OR oral sensitivity) AND (texture OR lumpy OR mashed) AND (infant OR toddler)* (CINAHL)
- *TITLE-ABS-KEY("oral sensory") AND TITLE-ABS-KEY(texture) AND TITLE-ABS-KEY(infant)* (Scopus)

A final combined search string applied was:

"oral sensory" OR "oral sensitivity" OR "sensory processing" AND "texture acceptance" OR "lumpy foods" OR "textured foods" OR "pureed foods"

AND infant OR toddler OR "0–24 months".

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Inclusion Criteria

Studies were included if they met the following criteria:

- Population: Infants or toddlers aged 0–24 months (or studies reporting extractable data for this age range).
- Exposure: Any form of oral sensory processing difficulty, including oral hypersensitivity, hyposensitivity, sensory reactivity, gagging, aversive oral responses, or sensory-based feeding challenges.
- Outcome: Measures relating to transition from pureed to textured foods, including acceptance or refusal of mashed, lumpy, chewy, or piece textures.
- Study Type: Empirical studies (RCTs, cohort, case–control, observational, cross-sectional, mixed-methods, qualitative).
- Language: English.
- Publication Years: 2018–2025.
- Publication Type: Peer-reviewed full texts.

Exclusion Criteria

Studies were excluded if they:

- Included children older than 36 months without extractable infant data.
- Included participants diagnosed with Autism Spectrum Disorder (ASD), due to distinct sensory-profiling pathways not representative of general infant populations.
- Did not assess oral sensory processing or related sensory-based feeding behaviors.
- Did not evaluate texture acceptance or feeding transitions.
- Were review articles, commentaries, conference abstracts, editorials, or protocols.
- Were non-English or published before 2018.
- Focused solely on medical dysphagia, tube-feeding, or non-oral feeding methods

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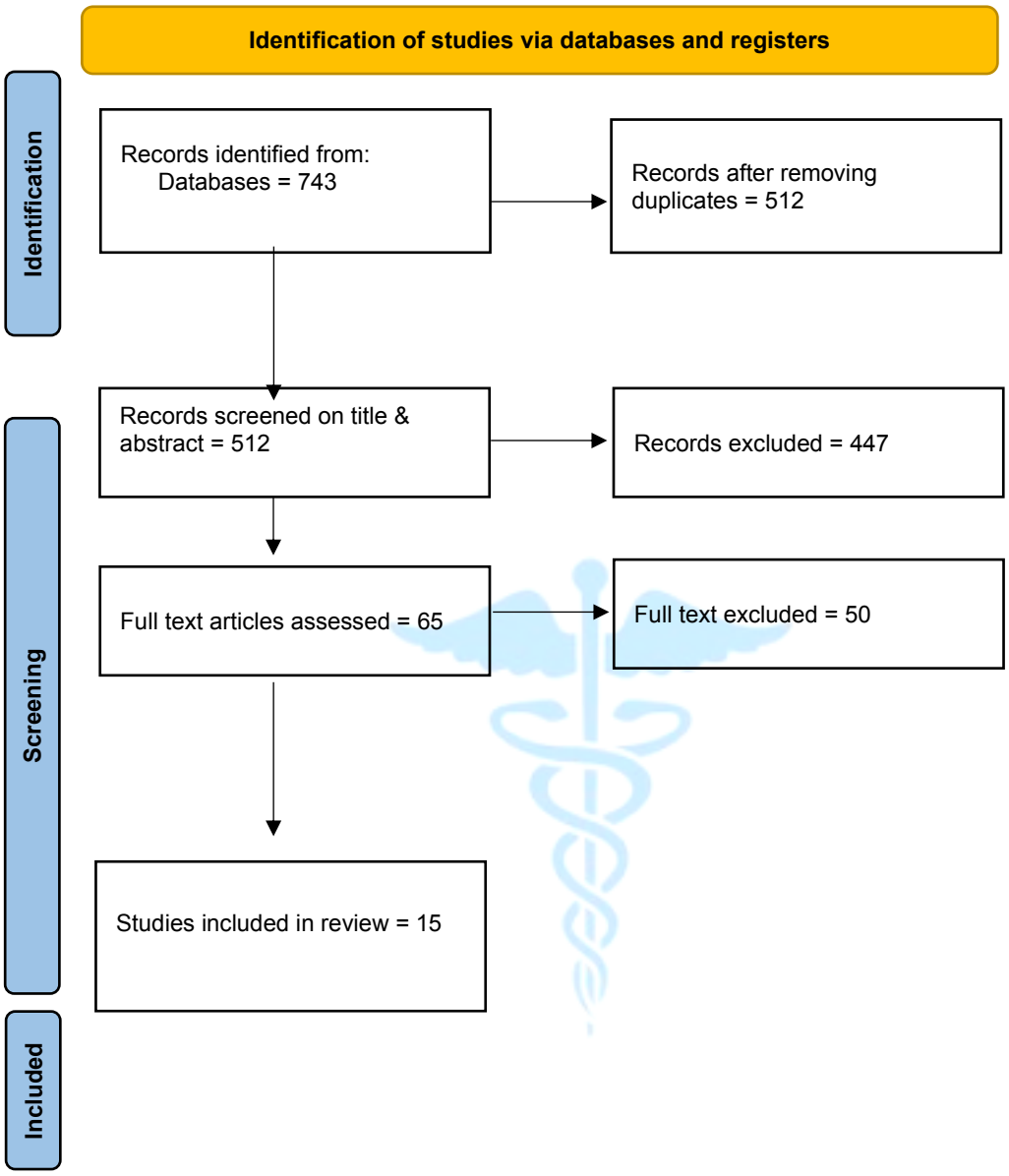
PRISMA FLOW CHART:



Study Selection

Search results were exported into a reference management tool, and duplicates were removed. Titles and abstracts were screened against the eligibility criteria. Full texts of potentially eligible studies were retrieved and assessed for inclusion. Disagreements were resolved through open discussion and a consensus-based approach. A PRISMA flow diagram summarizes the selection process.

Data Extraction

A structured data extraction form was used to capture:

- Author, year, country
- Study design
- Sample characteristics (≤24 months)
- Oral sensory processing measures
- Texture/feeding outcomes
- Key findings
- Study-specific research gaps
- Future Implications
- Limitations

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- Future responsibilities

All extracted data were cross-checked for accuracy and consistency.

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Data Extraction Table/ Summary Table:

No.	Author & Year	Country	Study Design	Sample (≤24 months)	Oral Sensory Measure	Texture / Feeding Outcome	Statistical Analysis	Key Findings	Limitations
1	Demonteil et al. (2019)	France	Longitudinal cohort	6–18 months (n≈120)	Parent-reported gagging, sensitivity	Acceptance of mashed, lumpy, pieces	Longitudinal associations between early sensory responsiveness and later texture acceptance (e.g. correlations / mixed models).	Early sensory responsiveness improved texture acceptance.	Reliance on parent-reported measures; recall bias; relatively homogeneous sample.
2	Tournier et al. (2021a)	France	Cross-sectional	4–36m (≤24m extracted) n=2999	Oral/tactile sensitivity	Acceptance of 7 textures	Associations between sensory sensitivity and texture acceptance (e.g. regression / ordinal models).	Sensory sensitivity predicted poor texture acceptance.	Cross-sectional design; infants not analysed separately; subjective parent-report only.
3	Tournier et al. (2021b)	France	Pilot RCT	8–15 months	Observed gagging/aversion	Acceptance of lumpy/piece textures	Intervention vs control comparisons on texture acceptance (e.g. t-tests / ANOVA / regression).	Structured exposure improved acceptance.	Small pilot sample; limited statistical power; short follow-up.
4	Delaney et al. (2021)	USA	Observational	8–12 months	Gagging/refusal	Daily texture consumption	Group comparisons between sensory-reactive vs non-reactive infants (e.g. chi-square / regression).	Sensory-reactive infants stayed longer on purees.	Small, possibly non-representative sample; limited control for confounders; recall bias.

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5	Atsbha (2021)	Ethiopia	Trial	9–11 months	Observed aversion	Intake of coarse vs soft	Pre–post and between-group comparisons of intake (e.g. t-tests / ANOVA).	Responsive feeding improved acceptance.	Context- and culture-specific; narrow age range; observer expectations may influence ratings.
6	Surette et al. (2022)	USA	Survey	4–36m (≤24m extracted)	Sensory responsiveness	Exposure to 14 textures	Correlations / regression models between sensory scores and number/variety of textures consumed.	Sensory-reactive infants consumed fewer textures.	Parent-report and recall bias; cross-sectional design; no objective sensory thresholds.
7	Devezeaux de Lavergne et al. (2024)	India	Survey	4–36m (≤24m extracted)	Rejection behaviours	Texture introduction & refusal	Regression models examining links between sensory sensitivity and texture refusal.	Sensory sensitivity linked to refusal.	Sensory and motor contributions not disentangled; caregiver report only; contextual factors not fully controlled.
8	Somaraki et al. (2024)	Norway	Cohort	6–18 months	Sensory behaviours	Age of introducing pieces	Longitudinal modelling of age at introduction of pieces vs later texture progression (e.g. regression / survival).	Late sensory maturation predicted delay.	No direct, standardised sensory testing; possible unmeasured confounders; attrition may bias results.
9	de Paiva et al. (2023)	Brazil	RCT	6–12 months	Gagging/choking	Texture handling	Between-group comparisons of gagging/choking and handling complex textures (e.g. chi-square / ANOVA / regression).	Sensory-reactive infants gag more with complex textures.	Trial not originally powered or designed around sensory subgroups; limited detail on sensory profiling.

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10	Coulthard et al. (2018)	UK	Longitudinal cohort (n≈1,300)	4–24 months subset	Feeding difficulties, gagging, refusal	Timing of lumps, acceptance of textures	Regression models / odds ratios examining associations between age of lump introduction and later feeding problems.	Late introduction of lumps linked with later feeding problems & sensory-based refusal.	Sensory thresholds not directly measured; observational design; multiple non-sensory causes of later feeding problems.
11	Greene et al. (2023)	International	Meta-analysis (preterms transitioning to oral feeds)	NICU infants	Oral sensory-motor stimulation	Transition to thicker textures	Meta-analytic pooling of effect sizes (fixed/random-effects models, heterogeneity statistics).	Sensory stimulation improved readiness.	Focus largely on preterm infants; heterogeneous interventions and outcomes; limited data on term / low-risk infants.
12	Dharmaraj et al. (2023)	USA	Clinical	0–24 months (feeding disorders)	Sensory hyperreactivity	Acceptance of age-appropriate textures	Comparisons of puree dependence and texture acceptance across sensory profiles (e.g. group comparisons / regression).	Hypersensitivity predicted puree dependence.	Clinical referral bias; limited generalisability to community; mostly cross-sectional clinical data.
13	Destriatania et al. (2024)	Indonesia	Tool validation	6–24 months	MCH-FS sensory subscale	Texture refusal & feeding skill	Psychometric analyses (factor analysis, internal consistency, correlations with feeding outcomes).	High sensory scores → refusal.	Validation study only; culturally specific; feeding outcomes largely caregiver-reported.
14	Galai et al. (2024)	Israel	Retrospective cohort	≤24m with PFD	Sensory-motor classification	Age at texture progression	Group comparisons of age at texture progression across PFD categories (e.g. ANOVA / regression / survival analysis).	Sensory-based PFD showed greatest delay.	Retrospective, record-based data; limited detail on daily feeding context and parent–child interaction.

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15	Athaide et al. (2025)	Egypt	Qualitative	Includes <2 years	Caregiver sensory descriptions	Acceptance of mashed/lumpy/chewy	Primarily qualitative thematic/content analysis; basic descriptive statistics only if reported.	Smooth-texture dependence common.	Small, context-bound qualitative sample; findings not statistically generalisable; possible recall and interviewer bias.

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Data Analysis Approach

A thematic synthesis approach was used to analyze the findings extracted from the 15 included studies. The process followed the three-step method recommended for qualitative synthesis of quantitative and mixed-methods studies:

1. **Line-by-line coding of extracted data**

Key findings, sensory constructs, feeding outcomes, and methodological insights from each study were coded inductively.

2. **Development of descriptive theme**

Codes were grouped into broader descriptive categories reflecting common patterns across studies (e.g., sensory hyperreactivity, timing of texture introduction, structured exposure).

3. **Generation of analytical themes**

These descriptive categories were synthesized into higher-order analytical themes explaining the relationship between oral sensory processing and transition from pureed to textured foods in children under 2 years.

This approach allowed us to integrate a variety of study designs, including randomized controlled trials, cohort studies, observational studies, surveys, tool validation studies, and even qualitative study. Instead of pooling the statistical results for a meta-analysis, we interpreted them narratively to support the thematic patterns, given the differences in measures, outcomes, and sensory constructs across the studies.

Results

A total of 15 studies met the criteria for inclusion, which included longitudinal cohorts, randomized controlled trials, cross-sectional surveys, clinical evaluations, a tool validation study, a meta-analysis, and one qualitative study. Because of the differences in study designs, sensory measures, and outcomes, we couldn't conduct a meta-analysis. Instead, we used a thematic synthesis approach to bring together the findings from all the studies. From the data, we identified four main analytical themes along with one overarching theme that cut across them.

Theme 1: Sensory Hyperreactivity

Across multiple studies, it was found that infants with heightened sensitivity to touch or taste were much more prone to gagging, choking, refusing lumpy foods, and relying on purees for a longer time. These sensory-reactive infants tended to eat fewer types of textures, had a stronger dislike for lumpy or mixed foods, and took longer to transition to age-appropriate solid foods. This trend was observed in both community and clinical groups. Overall, the findings suggest that sensory hyperreactivity plays a key role in delaying the progression to more varied textures in children under the age of two.

Theme 2: Texture Timing

A number of longitudinal and cohort studies have pointed out just how crucial it is to introduce textured foods to infants at the right time. When lumps or pieces are introduced after 9 to 10 months, it often leads to feeding issues down the line, such as a reliance on purees, refusal of different textures, and increased sensitivity to new foods. On the flip side, infants who are given textured foods within the recommended developmental timeframe tend to have smoother transitions and face fewer feeding challenges. This really highlights how important the timing of exposure is in helping babies adapt to different textures in their diets.

Theme 3: Structured Exposure

Research shows that introducing textured foods, using sensory-motor therapy, and applying responsive feeding techniques can really help infants become more accepting of different textures. Studies, including randomized trials, have found that a structured and gradual approach to exposure can significantly reduce gagging and improve how babies handle various textures. These results indicate that sensory responsiveness can be changed, and that well-planned intervention programs can be beneficial for infants facing sensory-related feeding difficulties.

Theme 4: Measurement Gaps

A recurring theme in the studies we've looked at is the heavy reliance on parents to report sensory behaviors. Only a handful of studies actually used objective sensory assessments, clinical evaluations, or standardized measurement tools. This dependence can lead to subjectivity, recall bias,

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and differences in how sensory responses are understood. It's clear that current research is missing objective, validated sensory assessment tools, which makes it harder to accurately pinpoint sensory-related feeding challenges.

Cross-Cutting Theme: Contextual Variability

Differences in cultural feeding norms, caregiver perceptions, and inadequate differentiation between sensory and motor feeding issues were evident across studies. These contextual and methodological variations limit generalizability and complicate interpretations of sensory-related feeding outcomes. This cross-cutting theme emphasizes that cultural practices and methodological inconsistencies influence how sensory feeding behaviors are understood and managed.

Open Codes (Line-by-Line Codes)	Descriptive Themes	Analytical Themes (Final Themes)
• Gagging with textured foods • Choking during lumps • Oral sensory hyperreactivity • Refusal of lumpy/mixed textures • Dependence on purees	**Sensory Over responsiveness**	**Theme 1: Sensory Hyperreactivity Delays Progression to Textured Foods**
• Late introduction of pieces • Lumpy foods after 9–10 months • Delayed sensory maturation • Staying longer on purees	**Delayed Texture Introduction**	**Theme 2: Timing of Texture Introduction Influences Later Feeding Outcomes**
• Structured lumpy exposure improved acceptance • Sensory-motor therapy improved readiness • Responsive feeding increased texture acceptance	**Effectiveness of Structured Exposure and Interventions**	**Theme 3: Structured Exposure Improves Texture Acceptance**
• Parent-reported measures only • Recall bias • No objective sensory tests • Caregiver perception limitations	**Measurement Limitations**	**Theme 4: Lack of Objective Sensory Measurement in Current Research**
• Cross-cultural variation in feeding norms • Motor difficulties not separated from sensory issues • Lack of clinical classification in some studies	**Contextual & Methodological Gaps**	**Cross-Cutting Gap Across All Themes**

Discussion

This review brings together findings from fifteen studies to explore how oral sensory processing affects infants as they transition from pureed to textured foods. The results strongly highlight the first theme, Sensory Hyperreactivity, as a major factor contributing to feeding resistance in children under two. Across various study designs, infants with increased oral or tactile sensitivity were more likely to experience gagging, choking, and refusal of lumpy foods .These findings align with previous research indicating that sensory over responsivity can hinder a child's ability to explore and accept new textures, which in turn delays their oral-sensory adaptation. Thus, this review reinforces the idea that sensory hypersensitivity plays a crucial role in slowing down texture progression during infancy.

The second key finding revolves around Texture Timing, which echoes earlier developmental studies that stress the importance of introducing textured foods during the critical window of about 7–10 months. Several cohort and longitudinal studies included in this review found that delaying the introduction of textured foods was linked to sensory-based refusals, prolonged reliance on purees, and later feeding challenges. These results support earlier evidence suggesting that late exposure limits opportunities for sensory exploration and oral desensitization, ultimately impacting later feeding skills.

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The third theme, Structured Exposure, emphasizes that sensory responsiveness can be modified and improved through targeted interventions. Intervention studies showed that guided exposure to lumpy or mixed textures, sensory-motor stimulation, and responsive feeding practices led to better texture handling and acceptance. These findings are in line with clinical sensory-integration models, which propose that the controlled sensory experiences play a key role in helping children get used to different textures and prepare their mouths for solid foods.

The fourth theme, Measurement Gaps, came up because many studies depend heavily on what caregivers report about sensory behaviours. A lot of research didn't use objective tools to assess sensory responses and biases in how caregivers perceive these behaviours might have skewed the results. Previous reviews have also pointed out the lack of standardized sensory thresholds for infants, cautioning that relying on subjective reports could lead to less accurate diagnoses.

Lastly, the overarching theme of Contextual Variability highlights how cultural differences affect feeding practices (think India, Ethiopia, Indonesia), the inconsistent ways sensory and motor feeding challenges are distinguished, and the variations in research methods across different studies. These insights align with earlier findings that show cultural context significantly shapes how textures are introduced, what caregivers expect, and overall feeding practices, which could limit how broadly we can apply sensory-based conclusions.

In summary, this review enhances the current research landscape by providing a clear thematic framework that illustrates how sensory processing, timing of exposure, structured interventions, and contextual elements all work together to influence how children accept different textures during their early years.

Conclusion

This systematic review wraps up by emphasizing the crucial role that oral sensory processing plays in helping infants move from pureed to textured foods. It was found that sensory hyperreactivity often leads to feeding resistance, which includes issues like gagging and refusing textured foods. On the flip side, introducing texture at the right time appears to be a key protective factor against future feeding challenges. The review also highlights that structured exposure and sensory-motor interventions can be quite beneficial, suggesting that we can modify sensory responsiveness with targeted strategies. However, the reliance on subjective sensory measures and the variability in context across different studies do limit the strength and generalizability of these findings. Overall, these results underscore the importance of adopting sensory-informed complementary feeding practices and the need for more rigorous research to shape early feeding interventions.

Limitations and Future directions:

This review does have its limitations. The studies included varied widely in their design, sensory measures, and definitions of outcomes, which makes it hard to compare them and prevents a meta-analysis. Most of the studies depended on caregiver-reported sensory behaviors, which can introduce subjectivity and recall bias, while only a few utilized objective or clinical sensory assessments. Additionally, several studies didn't clearly separate sensory issues from motor feeding difficulties, and cultural differences across settings limit how broadly we can apply these findings.

Looking ahead, future research should focus on creating standardized, objective tools for assessing oral sensory processing in infants, reducing the reliance on parent reports, and employing longitudinal designs to gain a better understanding of how sensory traits develop during the first two years. It's also important for studies to clearly distinguish between sensory, motor, and behavioral feeding mechanisms and to conduct culturally diverse intervention trials to pinpoint effective, sensory-informed feeding strategies.

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