

# Changes in Caregiver Outcomes After Participation in the Engaged Eaters Program: A Caregiver-Mediated Feeding Intervention for Autistic Children and Their Families

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**Importance:** Caregivers are essential partners in caregiver-mediated interventions that build on family routines and practices. Research identifying how participation as an intervention partner influences caregivers' outcomes, including stress and self-efficacy, is scarce.

**Objective:** To evaluate caregiver outcomes (stress, self-efficacy, and positive feeding responses and confidence) after participation in the Engaged Eaters Program.

**Design:** Quasi-experimental pretest–posttest design.

**Setting:** In-home via telehealth.

**Participants:** Fourteen primary caregivers of an autistic child (ages 2–7 yr) with feeding challenges.

**Intervention:** The Engaged Eaters Program–Telehealth, a caregiver-mediated 6-mo in-home telehealth feeding intervention for autistic children ages 2 to 7 yr that included 24 intervention visits, eight caregiver training modules, and consultation with a dietitian.

**Outcomes and Measures:** Relationships between child feeding challenge severity and caregiver outcomes and individual differences in caregivers' intervention responses were evaluated. We assessed caregivers' stress (Parenting Stress Index, Fourth Edition Short Form), self-efficacy (Parent Sense of Competence Scale), Positive Feeding Responses and Confidence (PFRC; composite score of items from other assessments), and individual intervention response using pre- to postintervention change in scores.

**Results:** Exploration of individual differences revealed that only caregivers with intake PFRC scores below the mean made significant improvements by the end of the intervention. No significant group-level changes were identified for stress, self-efficacy, or PFRC. Feeding challenge severity was not significantly related to caregiver outcomes.

**Conclusions and Relevance:** The results emphasize the importance of considering baseline practices, efficacy, and caregiver confidence when engaging caregivers in intervention. Future research should explore the nuanced relationship between caregiver outcomes and child characteristics.

**Plain-Language Summary:** Caregivers are essential partners with feeding interventions that build on family routines and practices. When working with caregivers, occupational therapists should consider caregivers' readiness for and responses to an intervention because intervention practices may differentially affect caregivers' parenting practices, confidence, and self-efficacy. Caregivers' responses may also affect the overall effectiveness of a caregiver-mediated intervention.

**Positionality Statement:** The term *caregiver-mediated* is used throughout this article in place of *parent-mediated* to be inclusive of all types of caregivers.

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Caregiver-mediated pediatric intervention approaches engage the child, caregiver, and family system in the intervention process and have been shown to improve outcomes for autistic children, including joint attention, adaptive functioning, expressive language, and play (Althoff et al., 2019). Key components of the caregiver-mediated intervention approach include integration into the natural family context, inclusion of caregiver capacity building, and continued collaboration between therapists and caregivers (Althoff et al., 2019). Recent calls for increased family-centered intervention have contributed to growth of caregiver engagement in pediatric occupational therapy interventions, specifically for autistic children (Lord et al., 2021). Caregiver-mediated interventions embedded in a family context have the potential to influence primary child outcomes as well as secondary outcomes for caregivers (Althoff et al., 2019; Oono et al., 2013). A review by Wainer et al. (2017) emphasized that increased measurement of caregiver-specific outcomes of caregiver-mediated intervention is needed and essential to advance the study and understanding of the effectiveness of caregiver-mediated interventions. However, few studies have considered how contextually embedded and family-engaged interventions affect the family, specifically caregivers.

A few research studies have captured changes in caregiver stress as a possible outcome measure for caregiver-mediated interventions; however, results are inconsistent across studies. In a systematic review of randomized controlled trials of caregiver-mediated interventions, 2 of the 17 included studies measured changes in caregiver stress and found no significant effects (Oono et al., 2013). Two additional studies in the review included caregiver outcomes of efficacy and intervention satisfaction (Oono et al., 2013). A more recent review by Althoff et al. (2019) identified measurement of caregiver outcomes in 4 of 13 studies. Four studies identified significant decreases in parental stress, and 1 study identified a significant improvement in parents' self-efficacy. These reviews highlight the low percentage of caregiver-mediated intervention research attending to caregiver outcomes, the inconsistency in results, and a primary focus on caregiver stress.

Caregiver stress and disrupted well-being are commonly associated with an autism diagnosis and child behaviors (Bonis, 2016; Enea & Rusu, 2020; Hayes & Watson, 2013; Suarez et al., 2014; Yorke et al., 2018; Zlomke et al., 2020). Elevated experiences of caregiver or parental stress are well documented among families with autistic children in comparison with families of nonautistic children and families of children with other developmental disabilities (Bonis, 2016; Hayes & Watson, 2013; Pastor-Cerezuela et al., 2021). One significant concern is how the trajectory of research thus far has focused on caregivers' distress, which may overlook resilience and strengths of families with autistic children. Overlooking resilience and focusing on distress implies that it is more difficult to parent

autistic children or that there are unavoidable challenges to having an autistic child in the family. A few studies have measured resilience among caregivers of autistic children, yet resilience is often studied in association with stress, and family strengths are not identified (Ghanouni & Hood, 2021; Pastor-Cerezuela et al., 2021). As such, interventions may be aimed at reducing distress when an alternative option may be to build capacity in families. Recent literature has pointed to the importance of attending to caregivers' self-efficacy, especially in considering intervention implementation (Schertz et al., 2020). There is immense value in identifying and understanding not only the factors related to caregivers' experiences of distress, but also opportunities to build on caregivers' strengths and expand their sense of self-efficacy in the parenting role.

Results from a few studies measuring caregiver outcomes after caregiver-mediated interventions have demonstrated emerging effects across caregivers' responsiveness and capacity for reflection while also improving children's adaptive behavior, social skills, intellectual development, language, and communication (Osborne et al., 2007; Ratliff-Black & Therrien, 2020; Siller et al., 2014). Furthermore, caregiver coaching and training are often a component of caregiver-mediated interventions (Althoff et al., 2019; Oono et al., 2013). An emerging body of literature using an occupational performance coaching approach has demonstrated significant effects for caregivers by directly targeting caregiver outcomes, including caregiver capacity and self-efficacy, during coaching interventions (Graham et al., 2016; Jamali et al., 2022). Measurement of caregiver outcomes should expand from measurement of caregiver stress to capture other possible intervention effects, including caregivers' sense of efficacy and practices relevant to the intervention targets.

Feeding challenges are a significant concern for caregivers of autistic children and may present an opportunity to support caregivers' development of practices to support their child's feeding and self-efficacy through intervention. The prevalence of feeding challenges among autistic children can be as high as 84% (Leader et al., 2020). Family mealtime is often significantly disrupted by feeding challenges, including children's food selectivity, limited diet variety, sensory aversions to food properties, rigid mealtime practices, disruptive mealtime behaviors, and difficulty participating in family mealtimes (Marshall et al., 2014; St. John et al., 2022). Caregivers of autistic children with feeding challenges express a significant desire for successful family mealtime and inclusion of their autistic child in a meaningful family mealtime routine (Althoff et al., 2019; Burkett et al., 2022; Curtiss & Ebata, 2019). Research supports the importance of routines, including mealtime, in contributing to family identity and well-being (Curtiss & Ebata, 2019; Fiese, 2021; Koome et al., 2012). Mealtime routines and

feeding are considered to be one of the most stressful occupations in families with autistic children who have feeding challenges (S. N. Adams et al., 2021; Ausderau & Juarez, 2013; Burkett et al., 2022; Marquenie et al., 2011), making them an important indicator in feeding interventions. Caregiver-mediated interventions may offer an opportunity to expand caregiver capacity and self-efficacy during mealtime through intentional caregiver education targets and partnering with caregivers to embed individualized intervention strategies in the family mealtime.

Additional research on the impact of caregiver-mediated interventions is essential to expand the understanding of how caregivers and families are affected by participation in the intervention process. Evaluation of caregiver-mediated interventions should include exploration of caregiver-specific outcomes as well as consideration of changes in family routines and experiences. The Engaged Eaters Program is a caregiver-mediated feeding intervention program designed to offer individualized intervention strategies and build caregiver capacity for supporting their autistic child's feeding and mealtime participation. The nature of the Engaged Eaters Program as a contextually embedded intervention offers the possibility for expanded benefits to affect caregiver outcomes. The Engaged Eaters Program pilot study applied the intervention using an in-home face-to-face model (Ausderau et al., 2020). Results of the pilot study showed that the program was effective at meeting child and family goals, and qualitative analysis identified that caregivers were satisfied with the intervention and reported developing new skills related to supporting their child's feeding and mealtime participation (Hladik et al., 2024). The primary outcome for the Engaged Eaters Program is attainment of child and family feeding goals. The current study is an exploratory evaluation of secondary caregiver outcomes (e.g., stress, efficacy, and feeding practices) after participation in the Engaged Eaters Program adapted for virtual delivery. The purpose of this study was to (1) evaluate changes in caregiver outcomes of stress, self-efficacy, positive feeding responses, and behaviors after participation in the Engaged Eaters Program–Telehealth and (2) identify whether severity of child baseline feeding challenge and postintervention change in feeding challenge severity predicted postintervention change in caregiver outcomes of stress, self-efficacy, and positive feeding responses and behaviors after participating in the Engaged Eaters Program–Telehealth.

## Method

A quasi-experimental pretest–posttest design was used to evaluate the effects of participation in the Engaged Eaters Program–Telehealth on caregiver outcomes. Changes in caregiver stress and self-efficacy and relationships between caregiver outcomes and child's feeding challenge severity at enrollment in the intervention were analyzed. In addition, individual

differences in caregivers' responses to intervention were explored.

## Participants

Fifteen caregiver–child dyads completed the Engaged Eaters Program–Telehealth intervention. One dyad had missing caregiver data for the final timepoint and was not included in this analysis. Recruitment fliers were distributed through a university-sponsored research registry and an academic and university email distribution list, and they were posted at community pediatric therapy clinics. In addition, recruitment information was shared as social media posts in Facebook groups for parents and caregivers of autistic children and published as a Facebook advertisement. All dyads were screened for inclusion criteria and completed informed consent before participating. Additional adults present in the home completed informed consent for any recorded mealtimes or feeding observations. All procedures were approved by the University of Wisconsin–Madison institutional review board (Study ID 2016-1428).

Dyads consisted of a primary caregiver and an autistic child with feeding challenges (ages 2–7 yr) who completed the Engaged Eaters Program–Telehealth intervention. To participate in the study, the child needed to have a diagnosis of autism and caregiver-reported feeding challenges. Autism diagnosis was not confirmed through clinical testing. However, caregivers were asked to report details on when and from whom they received the diagnosis. Caregivers had to live with the child at least 50% of the time. Caregiver–child dyads were excluded if the child had a diagnosis of a co-occurring genetic disorder (e.g., Down syndrome, fragile X syndrome), a significant neurodevelopmental condition (e.g., cerebral palsy), or a primary sensory impairment (e.g., blindness or deafness). Co-occurring diagnoses were selected for exclusion if there was a high likelihood that co-occurring presentation could contribute to additional or differential feeding challenges for children. At its current stage of development, the intervention is designed to address the needs of autistic children and families and would require future adaptation and expansion to meet the needs of children with other diagnoses. Children with a diagnosis of intellectual disability, attention deficit hyperactivity disorder, or a mental health condition (e.g., anxiety) were not excluded from participation. Children receiving feeding-focused intervention services were excluded. Table 1 presents the demographic characteristics of the participating dyads.

## Engaged Eaters Program Feeding Intervention

The Engaged Eaters Program–Telehealth is a caregiver-mediated feeding intervention for autistic children and their families (Hladik et al., 2023). The program was delivered in the home over Zoom and included a combination of comprehensive caregiver training on feeding challenges and contributing factors, caregiver–therapist

**Table 1. Participant Characteristics**

| Characteristic                                    | n (%)         |
|---|---------------|
| Child's chronological age, mo, <i>M (SD)</i>      | 59.07 (17.52) |
| SRS-2 <i>T</i> score, <i>M (SD)</i>               | 71.77 (13.94) |
| Sex   |               |
| Male  | 10 (71.41)    |
| Female  | 4 (28.57)     |
| Maternal education                                |               |
| Partial high school or less                       | —             |
| High school or GED                                | —             |
| Associate's degree or partial college             | 3 (21.43)     |
| Bachelor's or master's degree                     | 10 (71.41)    |
| Advanced degree, such as doctorate                | 1 (7.14)      |
| Missing or chose not to answer                    | —             |
| Annual household income, \$                       |               |
| <20,000   | —             |
| 20,000–39,999                                     | —             |
| 40,000–59,999                                     | 3 (21.43)     |
| 60,000–79,999                                     | 1 (7.14)      |
| 80,000–99,999                                     | 5 (35.72)     |
| ≥100,000  | 4 (28.57)     |
| Missing or chose not to answer                    | 1 (7.14)      |
| Child race/ethnicity (could select more than one) |               |
| Black/African American                            | 2 (14.29)     |
| American Indian/Alaskan Native                    | 1 (7.14)      |
| Asian   | 2 (14.29)     |
| Native Hawaiian/Pacific Islander                  | —             |
| Other   | 1 (7.14)      |
| White   | 12 (85.71)    |
| Hispanic or Latino origin                         | 1 (7.14)      |
| Geographic location                               |               |
| Urban (population ≥50,000)                        | 5 (35.71)     |
| Rural or urban cluster (<50,000)                  | 9 (64.29)     |
| Therapy services received by child                |               |
| Occupational therapy                              | 12 (85.71)    |
| Speech therapy                                    | 11 (78.57)    |
| Physical therapy                                  | 6 (42.86)     |
| Applied behavioral analysis                       | 7 (50.00)     |
| Other behavioral                                  | 2 (14.29)     |

*Note.* Children receiving intervention services focused on feeding goals were excluded from participation. Dashes indicate categories with zero responses. SRS-2 = Social Responsiveness Scale, Second Ed. (Constantino & Gruber, 2012).

collaboration on goals and intervention strategies, a direct feeding intervention, and modeling of intervention techniques. The program included 24 weekly intervention

sessions and 8 caregiver-focused training modules delivered across approximately 6 mo. In addition, families received face-to-face assessment pre- and post-intervention and a minimum of one consultation with a dietician. Individualized intervention goals were set collaboratively with caregivers at the initiation of the intervention, and caregivers were engaged in the selection and delivery of intervention strategies throughout the program. Caregiver training modules on feeding-specific topics include understanding caregiver-mediated interventions, setting goals, impact of family well-being on child feeding challenges, understanding sensory responses during feeding, development of feeding skills, mealtime behavior challenges, mealtime routines, child health, and child nutrition. The Engaged Eaters Program–Telehealth used the same protocol and session structure as the face-to-face Engaged Eaters Program.

The Engaged Eaters Program intervention was designed by an occupational therapist to be delivered by professionals working in eating and mealtime therapy. All Engaged Eaters Program–Telehealth sessions and assessments were delivered by research team members, which included two licensed occupational therapists (Brittany St. John and Karla Ausderau), two supervised occupational therapy fieldwork students, and one registered dietician. Interventionists delivering sessions to participants received direct training in the Engaged Eaters Program protocol, were provided opportunities to observe senior therapists deliver sessions, and participated in research team meetings three to four times a month while working in the program to ensure adherence to the Engaged Eaters Program protocol.

## Measures

### *Family Demographics Questionnaire*

The family demographics questionnaire was created for the Engaged Eaters Program intervention study. Family demographics including household income, maternal education, child characteristics, and therapeutic services received by the child were collected during enrollment.

### *Feeding and Eating in Autism Together Assessment*

The Feeding and Eating in Autism Together (FEAST) assessment is an 84-item caregiver-report feeding assessment for autistic children (Ausderau, 2022). Part 1 of the FEAST (Items 1–32) has demonstrated construct validity for the four feeding challenge classification subscales (Sensory, Behavior, Oral Motor, and Gastrointestinal; Ausderau, 2022). Part 2 of the FEAST includes 52 clinical utility items to further characterize a child's feeding challenges and a caregiver's primary areas of concern. Caregivers completed the FEAST questionnaire during their pre- and post-intervention assessments for the Engaged Eaters Program–Telehealth. The FEAST total feeding

challenge severity score was used to characterize child feeding challenges within the sample.

### *Parenting Stress Index–4 Short Form*

The Parenting Stress Index, Fourth Edition Short Form (PSI–4–SF) is a 36-item caregiver-report measure of perceived parenting (or caregiver) stress (Abidin, 2012). Scores are calculated for total caregiver stress as well as for three domains: Parental Distress, Parent–Child Dysfunctional Interaction, and Difficult Child (Abidin, 2012). Responses on the PSI–4–SF were used to measure self-reported caregiver stress before and after participation in the Engaged Eaters Program.

### *Parent Sense of Competence Scale*

Caregivers complete the Parent Sense of Competence (PSOC) scale during their pre- and postintervention assessments for the Engaged Eaters Program. The PSOC includes 17 items and measures caregivers' satisfaction with parenting and their perceived self-efficacy in the parenting role (Gibaud-Wallston & Wandersman, 1978). The PSOC has previously been used to measure the self-efficacy of parents of autistic children and detected significant change (Dunn et al., 2012). All 17 items on the PSOC are scored on a 6-point scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) with no neutral option in the middle. Items are scored so that a higher score indicates a higher sense of competency. Responses from the PSOC were used to measure changes in caregiver efficacy after participating in the Engaged Eaters Program–Telehealth.

### *Caregiver Positive Feeding Responses and Confidence Composite Score*

The Positive Feeding Responses and Confidence (PFRC) was created for this study to explore individual items across measures that are most proximally related to the changes being targeted in caregivers in relation to mealtime and feeding their autistic child. The research team worked together to select individual items from the standardized measures used in the study protocol that provided a measurement of caregiver mealtime practices directly addressed through caregiver training modules (e.g., presentation of new or nonpreferred foods, play during meals, use of consistent mealtime routines) and measures of caregiver confidence. The research team consisted of one doctoral candidate (St. John) and five senior researchers (including Ausderau) who reached consensus on the selection of all included PFRC items. The PFRC score is a composite of six items from the FEAST Part 2, two items from the PSI–4–SF, and one item added to the study intake assessments by the research team. Items from the PSOC were not included in the composite score because individual items on the PSOC were not directly related to mealtime. Six items from FEAST Part 2 included caregiver responses to feeding

challenges during mealtime (e.g., making separate meals, offering new or previously offered foods, use of play, and use of rewards and consequences). Two items from the PSI–4–SF were included as measures of caregiver confidence (“I feel I am: very good . . . not very good at being a parent” and “I have found that getting my child to do something is: much harder . . . much easier than I expected”). Finally, one item was added to the intake assessments to measure predictability of the family’s mealtime routine (“Our family has a regular mealtime routine”). Items were scored so that higher composite scores equated to increased use of positive caregiver strategies (e.g., offering new foods, use of play), decreased use of negative caregiver responses (e.g., use of rewards and negative consequences to increase eating), increased caregiver confidence, and increased mealtime routine. Pre- and postintervention scores were calculated for each participant and pre- to postintervention change was calculated.

### **Data Management and Analysis**

Caregiver responses on the PSI–SF and PSOC were scored according to the manual or scoring guide. Child FEAST scores for feeding challenge severity (i.e., FEAST total score) were calculated using the scoring guide (Ausderau, 2022). Responses to selected items were compiled to calculate the caregiver PFRC composite score, as described earlier. All assessment scores were confirmed by a second independent scorer. Data were stored on an encrypted secure server in a locked office. All analysis was completed using R statistical software (Version 4.1.2) and R Studio (RStudio Team, 2020). Nonparametric testing was completed because of the violation of the assumption of normality and sample size concerns.

For caregivers, pre- and postintervention PSI–4–SF total scores, PSI–4–SF subscale scores, PSOC scores, and PFAC composite score were analyzed using a nonparametric Wilcoxon signed-rank test. Simple linear regression was used to analyze whether initial FEAST severity scores or pre- to postintervention change in FEAST severity scores predicted pre- to postintervention changes in PSI–4–SF total scores, PSI–4–SF subscale scores, PSOC scores, or PFAC composite scores. No correction was made for multiple comparisons because the analysis consisted of secondary outcomes (Li et al., 2017).

Individual-level changes for caregivers were explored using standardized mean differences between pre- and postintervention scores for individual participants across caregiver outcome measures (PSI–4–SF total and subscale scores, PSOC scores, and PFAC composite score). Individual-level changes have been identified as important to consider when evaluating intervention effects and baseline characteristics related to intervention response (Tang & Tang, 2020). The evaluation of individual differences is aligned with increased calls for patient-centered care, precision

medicine, and identification of which interventions work and for whom (Lord et al., 2021; Tang & Tang, 2020). Standardized mean differences have been recommended for use with dependent samples to evaluate individual-level change (Kline, 2013). This calculation provides a ratio of change for an individual, taking group variance into consideration by measuring change in units of group standard deviation (Kline, 2013). Previous work has confirmed that individual change exceeding half a standard deviation can be considered clinically meaningful change (Lorang et al., 2022; Norman et al., 2003, 2014) and aligns with a moderate effect (Cohen, 1988). Standardized mean differences ( $d$ ) were computed using the formula  $d = D_i/S_x$ , where  $D_i$  is the individual change and  $S_x$  represents the standard deviation of the group at baseline. Standardized mean differences were then categorized into three groups: improved ( $d \geq 0.50$ ), no change ( $-0.5 < d < 0.5$ ), and worsened ( $d \leq -0.50$ ), where clinically meaningful change was set at any change at or above a half a standard deviation from the baseline. Directionality of change was reversed for measures for which an improvement was represented by a decrease in score (e.g., for the PSI-4-SF, a decreased score indicates improvement).

## Results

The purpose of this quasi-experimental pretest–posttest study was to evaluate the impact of caregiver participation in the Engaged Eaters Program–Telehealth on caregiver-specific outcomes as indicated by PSI-SF, PSOC, and PFRC scores and to explore relationships between the child’s feeding challenge severity and caregiver outcomes. Nonparametric Wilcoxon signed-rank tests were completed for all pre- and postintervention scores. Results for the PSI-4-SF Total and all subscales, the PSOC, and the PFRC Composite were nonsignificant. Complete Wilcoxon signed-rank test results are presented in Table 2.

Separate linear regression models were run for each caregiver outcome measure to determine whether

children’s feeding challenge severity at baseline or change in feeding challenge severity predicted caregiver outcomes. Intake feeding challenge severity score (FEAST Total) and pre- to postintervention change in FEAST feeding challenge severity scores were used as single predictors in separate models for each outcome measure. All models were nonsignificant, and the complete results are presented in Table A.1 in the Supplemental Material (available online with this article at <https://research.aota.org/ajot>).

Standardized mean differences were calculated for individual participants for each caregiver outcome measure (PSI-4-SF Total and subscales, PSOC, and PFRC Composite). Standardized differences were classified as improved, no change, or worsened on the basis of the magnitude of change for each individual caregiver. Caregiver pre- and postintervention scores were graphed and color coded by standardized mean difference classification group (improved, no change, and worsened) to highlight patterns in individual response to intervention. Emerging patterns in individual differences on the PSOC and PFRC were identified (Figure 1). Patterns were not present in additional outcome measures. On the PSOC, all caregivers with postintervention change classified as worsened had baseline parenting self-efficacy scores above the group mean. However, caregivers who were classified as improved on the PSOC had scores across the range, and not all caregivers with high efficacy at intake worsened over the course of the intervention. With regard to the PFRC, all five caregivers who were classified as improved had intake scores below the group mean, yet not all caregiver with intake scores below the mean improved, and most caregivers were classified in the no-change group. Table 3 provides a detailed summary of mean intake scores on all caregiver outcome measures for the full sample and each standardized mean classification group.

## Discussion

This study evaluated the impact of participation in the Engaged Eaters Program–Telehealth on caregiver

**Table 2. Wilcoxon Signed Rank Test Results for Pre- to Postintervention Scores**

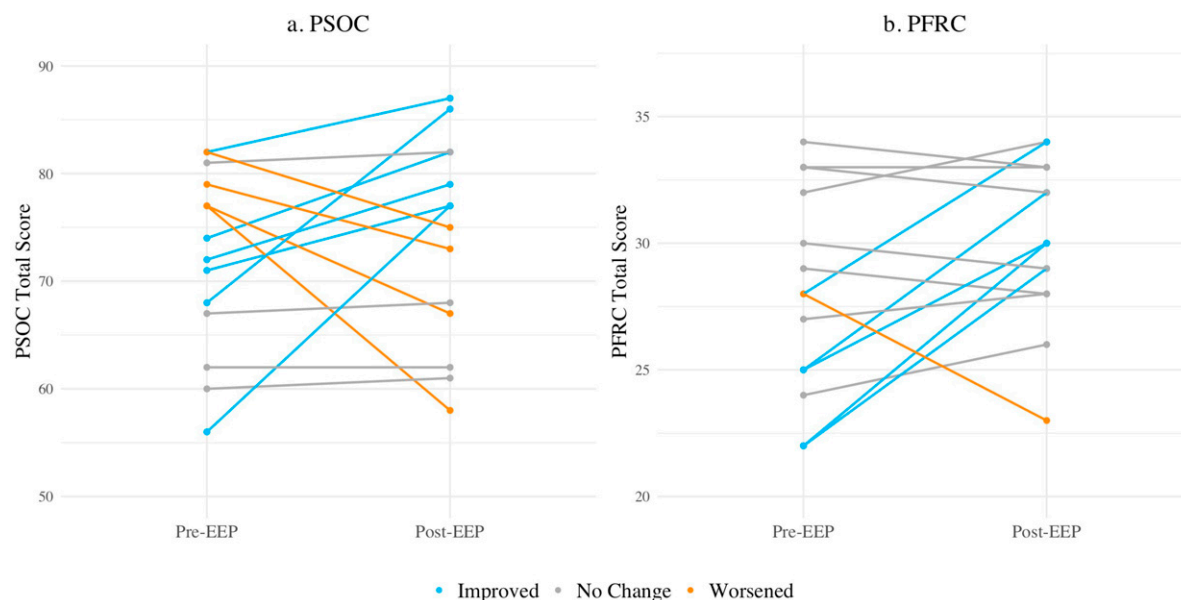
| Assessment   | Median Score |          | Z     | p   | Effect Size <sup>a</sup> |
|--|--------------|----------|-------|-----|--------------------------|
|  | Pre-EEP      | Post-EEP |       |     |                          |
| PSI-4-SF   |              |          |       |     |                          |
| Total score  | 90.0         | 98.0     | −0.25 | .81 | .07                      |
| Parent Distress Subscale   | 35.5         | 37.0     | −0.18 | .86 | .05                      |
| Parent Child Difficult Interaction Subscale                              | 27.5         | 27.0     | −0.04 | .97 | .01                      |
| Difficult Child Subscale   | 38.0         | 38.0     | −0.05 | .96 | .01                      |
| Parenting Sense of Competence Scale                                      | 73.0         | 76.0     | −0.70 | .48 | .19                      |
| Caregiver Positive Feeding Actions and Confidence Composite <sup>b</sup> | 28.0         | 30.0     | −1.72 | .08 | .46                      |

Note. EEP = Engaged Eaters Program; PSI-4-SF = Parenting Stress Index, Fourth Edition Short Form.

<sup>a</sup> Effect size calculated using  $z/\sqrt{n}$ .

<sup>b</sup> Caregiver Positive Feeding Actions and Confidence Composite Score created for this study.

**Figure 1. Pre- and postintervention scores on the PSOC (a) and PFRC Composite (b), color coded by standardized mean difference classification.**



*Note.* EEP = Engaged Eaters Program; PFRC = Positive Feeding Responses and Competence; PSOC = Parent Sense of Competence.

outcomes of stress (PSI-4-SF), self-efficacy (PSOC), and a composite of mealtime and caregiver feeding responses and confidence items (PFRC). Although no individual caregiver measure captured significant postintervention changes, exploratory analysis of individual differences suggests the possibility of different caregiver outcomes dependent on their level of efficacy and baseline feeding practices and confidence. Exploration of standardized mean differences on individual caregiver pre- to postintervention change in positive feeding responses and confidence (PFRC) showed improvement for caregivers who had scores below the mean at intake. No discernable trends for stress were identified through analysis of standardized mean differences.

Results of the linear regressions identified that child feeding challenge severity at intake and change in feeding challenge severity were not significantly related to any caregiver outcome, suggesting that the level of children's feeding challenges may not be related to caregiver stress or response to intervention. Research findings that do not reach statistical significance are important to consider and provide valuable information that works to combat dissemination bias (Sandercock, 2012). The findings of this study suggest that there may be an alternative explanation for previously identified relationships between child characteristics and caregiver level of stress (Enea & Rusu, 2020; Ghanouni & Hood, 2021; Yorke et al., 2018). Future research should explore whether child characteristics and challenges may be separate from caregiver outcomes such as stress and self-efficacy.

We hypothesized that the items compiled in the PFRC composite would capture significant

improvements in caregivers' mealtime and feeding practices and confidence by measuring items that were theoretically most proximally related to the intervention targets of the Engaged Eaters Program. The intervention program targets caregiver education, including delivery of caregiver modules on mealtime routines, development of feeding skills, and positive behavioral supports (Ausderau et al., 2020). Exploratory analysis of individual caregiver responses to intervention identified that only caregivers with intake scores below the mean experienced meaningful improvement in their PFRC scores. The PFRC composite score may not be an adequate measure for caregivers entering the intervention with higher baseline levels of confidence or those who were already using many positive feeding practices to support their child. Alternatively, the current intervention may not be sufficient to address the needs of caregivers who are using recommended practices without success or who have a high confidence level at baseline. However, qualitative findings from the face-to-face Engaged Eaters Program pilot study identified that caregivers reported developing new skills for feeding their child as a result of their participation (Hladik et al., 2024). Together, the results of the current study and caregiver qualitative responses during the Engaged Eaters Program pilot suggest that caregivers across the face-to-face and telehealth pilot samples may learn and benefit from the intervention. However, additional detailed measurement of caregivers' characteristics and practices at baseline and knowledge developed throughout the intervention may provide meaningful insight into shifts in daily practices to maximize their child's participation and optimize caregiver outcomes. Future interventions should

**Table 3. Standardized Mean Difference Comparisons by Outcome Measure**

| Outcome Measure and Classification Group            | Full Sample |                             |                       | Standardized Mean Classification Groups |                             |                       |
|---|-------------|-----------------------------|-----------------------|---|-----------------------------|-----------------------|
|   | <i>n</i>    | Intake Score, <i>M (SD)</i> | Change, <i>M (SD)</i> | <i>n</i>                                | Intake Score, <i>M (SD)</i> | Change, <i>M (SD)</i> |
| Parenting Sense of Competence Scale                 | 14          | 72.00 (8.44)                | 1.86 (10.52)          |   |                             |                       |
| Improved  |             |                             |                       | 6                                       | 70.50 (8.53)                | 10.83 (6.85)          |
| No change   |             |                             |                       | 4                                       | 67.50 (9.47)                | 0.75 (0.50)           |
| Worse   |             |                             |                       | 4                                       | 78.75 (2.36)                | -10.50 (5.92)         |
| Positive Feeding Responses and Confidence Composite | 14          | 28.00 (4.06)                | 2.07 (3.93)           |   |                             |                       |
| Improved  |             |                             |                       | 5                                       | 24.40 (2.51)                | 6.60 (1.14)           |
| No change   |             |                             |                       | 8                                       | 30.25 (3.45)                | 0.13 (1.36)           |
| Worse   |             |                             |                       | 1                                       | 28.00 (0)                   | -5.00 (0)             |
| PSI-4-SF  |             |                             |                       |   |                             |                       |
| Total Caregiver Stress                              | 13          | 99.54 (30.20)               | 1.08 (13.30)          |   |                             |                       |
| Improved  |             |                             |                       | 1                                       | 107.00 (0)                  | -25.00 (0)            |
| No change   |             |                             |                       | 11                                      | 99.82 (32.80)               | 1.27 (9.25)           |
| Worse   |             |                             |                       | 1                                       | 89.00 (0)                   | 25.00 (0)             |
| Parental Distress subscale                          | 14          | 34.93 (13.51)               | -0.15 (7.16)          |   |                             |                       |
| Improved  |             |                             |                       | 2                                       | 44.00 (5.66)                | -9.50 (3.54)          |
| No change   |             |                             |                       | 9                                       | 36.56 (13.57)               | -0.67 (4.27)          |
| Worse   |             |                             |                       | 3                                       | 24.00 (8.89)                | 9.67 (3.79)           |
| Parent-Child Dysfunctional Interaction subscale     | 14          | 27.71 (10.00)               | 0.00 (5.31)           |   |                             |                       |
| Improved  |             |                             |                       | 2                                       | 33.50 (4.95)                | -7.50 (2.12)          |
| No change   |             |                             |                       | 9                                       | 28.78 (11.51)               | -0.89 (2.80)          |
| Worse   |             |                             |                       | 3                                       | 20.67 (0.58)                | 7.67 (1.15)           |
| Difficult Child subscale                            | 13          | 38.15 (9.96)                | 0.23 (5.10)           |   |                             |                       |
| Improved  |             |                             |                       | 2                                       | 37.50 (0.71)                | -7.50 (2.12)          |
| No change   |             |                             |                       | 8                                       | 42.50 (8.19)                | -0.50 (2.07)          |
| Worse   |             |                             |                       | 3                                       | 27.00 (9.85)                | 7.33 (1.15)           |

Note. Standardized mean difference ( $d$ ) =  $D_i/S_x$ . Improved = ( $d \geq 0.50$ ); no change = ( $-0.5 < d < 0.5$ ); worsened = ( $d \leq -0.50$ ). PSI-4-SF = Parenting Stress Index, Fourth Edition Short Form.

consider opportunities for individualized approaches based on the baseline characteristics of caregivers and families. Furthermore, comparison of the pilot study's results and this study's results suggest the need to identify ways to capture the caregiver outcomes that are sensitive to change based on their baseline scores.

Future research should identify ways to capture caregiver outcomes that are proximally related to intervention targets and are sensitive to change for caregivers across the range of baseline scores. The importance of measuring caregiver outcomes was recently highlighted by a systematic review that emphasized the need to report parent baseline characteristics in caregiver-mediated intervention (Shalev et al., 2020). Caregivers' practices are infrequently considered when evaluating caregiver-mediated interventions but are essential to understanding autistic children's response to

intervention, informing family-centered treatment selection, and identifying therapeutic mechanisms of change (Ratliff-Black & Therrien, 2020). Emerging trends in the findings of this study suggest that caregivers may have modified mealtime practices after their participation in the intervention. Development of new caregiving practices as a result of participation in a caregiver-mediated intervention is an important outcome that has potential implications for how therapeutic interventions are designed and delivered. Future research should consider how to capture meaningful baseline characteristics of caregivers and identify sensitive measurements of expanded skill development after participation in caregiver-mediated intervention that aligns with the intervention protocol.

We hypothesized that caregiver stress would decrease and parenting efficacy would increase after participation



in the Engaged Eaters Program–Telehealth. However, results suggest that at the group and individual levels, caregivers did not experience a significant change in their stress or self-efficacy. One argument is that outcome measures (PSI–4–SF and PSOC) are both global measures of these constructs and not specific enough to mealtime or feeding occupations. In addition, caregivers participated in the Engaged Eaters Program–Telehealth at the height of the COVID-19 pandemic; therefore, they were likely experiencing increased global parenting stress that affected their overall scores (E. L. Adams et al., 2021). Another consideration is that engaging in a caregiver-mediated intervention often initially increases the amount of time parents are engaging in mealtime activities and presents new practices and strategies for them to learn. Caregivers in the Engaged Eaters Program face-to-face pilot study enjoyed and learned from their participation; however, they reported increased caregiving load and time to implement the intervention (Hladik et al., 2024). Therapists should weigh the benefit of engaging caregivers in the intervention process with the possibility that intervention collaboration will increase caregiving demands.

Evaluation of the standardized mean difference scores and classification groups (improved, no change, and worsened) revealed important trends in caregivers' PSOC responses. Many of the caregivers who started the intervention program with high self-efficacy worsened and experienced a decrease in their ratings after participation, whereas caregivers who improved had a wide distribution of intake scores across the PSOC scale. One possible explanation for the observed pattern is that caregiver education and consultation during the Engaged Eaters Program–Telehealth may have had differential effects on caregivers based on their level of efficacy at intake. Caregivers with high self-efficacy may have their confidence diminished by the intake of new information and strategies related to their child's feeding. Alternatively, caregivers who have a wider range of incoming self-efficacy may have been bolstered by the new information and strategies provided. Similar results were observed in a study focused on caregivers' capacity for reflection and self-evaluation (Siller et al., 2018). Siller et al. (2018) found that parents with an emerging capacity for self-reflection showed higher rates of growth after a parent coaching intervention compared with parents whose capacity was established. These emerging patterns suggest the possibility that caregiver practices at baseline could potentially be related to intervention response patterns. Future research should identify pathways to use caregiver measures to inform the matching of families to interventions that best meet their needs and are most likely to result in positive outcomes.

The results of this study highlight the need to consider caregivers' readiness and capacity before intervention to assess the potential for skill development and participation. Furthermore, caregiver baseline measures of stress or caregiving load may be

important factors to measure and consider before initiating intervention. Contrary to the results of this study, a previous study by Valeri et al. (2020) found that a caregiver-mediated intervention targeting social communication and child language outcomes had a secondary outcome of reduced caregiver stress. One possibility is the difference in the targeted child outcome of the Engaged Eaters Program intervention and the differences in caregiving roles necessary to achieve improvements in child feeding outcomes. Feeding is reported to be one of the most stressful occupations for caregivers of autistic children (S. N. Adams et al., 2021; Ausderau & Juarez, 2013; Burkett et al., 2022). Interventions focused on feeding and changing mealtime practices potentially increase caregiving loads and have a differential effect on caregiver stress. Moreover, participating caregivers' baseline capacity and knowledge may predict the change in caregiver and child outcomes after the intervention. Future research should work to identify the relationships among caregiver baseline measures, caregiver and child response to intervention, and changes in caregiver responsibilities to fully understand the effects of caregiver-mediated interventions across the family system.

## Strengths and Limitations

Strengths of this study include direct evaluation of multiple caregiver outcomes. In addition, the participant sample includes representation across rural, urban cluster, and urban locations. A major limitation of the study is the lack of a control or comparison group, which should be included in future Engaged Eaters Program trials. The study is limited by a small sample size that skewed high for income and education. Racial and ethnic diversity of the sample is comparable to the statewide demographics of Wisconsin (U.S. Census Bureau, 2022). The COVID-19 pandemic slowed recruitment and enrollment, and how the increased caregiving demands and stress during the pandemic affected our study participants was unclear. Last, although stress and efficacy measures were collected, they were not direct intervention targets and therefore may not be sensitive outcome measures. Future work could integrate qualitative interviews with caregivers regarding stress and self-efficacy. Qualitative data could potentially provide more nuanced measurement of individual experiences related to feeding their child and family mealtime.

## Implications for Occupational Therapy


Caregivers are an essential part of family routine and practices, with many interventions in the home being mediated by caregiver involvement (Althoff et al., 2019). Caregiver-mediated interventions are being encouraged as family-centered, specifically for autistic children (Lord et al., 2021). Little research has focused

on how participation as an intervention partner influences caregiver outcomes. This study considered caregiver outcomes after participation in the Engaged Eaters Program, a caregiver-mediated feeding intervention for autistic children with feeding challenges.

The findings of this study have the following implications for occupational therapy practice:

- Caregiver skills and readiness should be considered before intervention to assess the potential for skill development and participation.
- Caregivers with different baseline skill levels may respond differently during participation in caregiver-mediated interventions.

## Conclusion

This study presents caregiver outcomes on measures of self-efficacy, stress, and positive feeding practices and confidence after participation in the Engaged Eaters Program–Telehealth, a caregiver-mediated feeding intervention. The results of this study demonstrate the importance of measuring caregiver outcomes and considering the baseline practices, knowledge, confidence, and efficacy of caregivers when engaging them in a caregiver-mediated intervention. In this study, exploration of individual differences revealed an important emerging trend: Caregivers with lower levels of self-efficacy or confidence and who used positive feeding practices at baseline were those who made changes in their approach to feeding their autistic child after participation in the Engaged Eaters Program–Telehealth. Therapists should consider how caregiver-mediated intervention may be used to support caregivers in building confidence and shifting caregiving practices. No group-level differences were identified in caregiver stress, self-efficacy, or caregiver skills and confidence. However, individual-level change evaluated with standardized mean differences points to the importance of considering how caregivers' baseline characteristics may contribute to differential outcomes in response to intervention. Additional research is needed to determine the mechanisms behind the observed individual trends. 

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