

# Caregiver–infant and toddler interactions during diapering: Caregiver responsiveness and child well-being and involvement

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## Abstract

The findings of this empirical research provide new information about the importance of caregiver interactions during care routines, specifically diaper changing, in supporting infant and toddler involvement and well-being. This correlational study involved observations of 144 separate diapering cycles by 31 caregivers with 74 infants and toddlers in 30 infant and toddler classrooms in a U.S. Midwest city. Based on these observations, caregiver responsiveness was found to be significantly related to both child involvement and child well-being. Another feature of caregivers' behavior, caregiver encouragement, was significantly associated with child well-being, but not child involvement. The study results suggest that caregivers' behaviors, specifically responsiveness and encouragement, during diapering are vital proximal processes in the moment-to-moment interactions between a caregiver and child. Thus, responsiveness and encouragement in care routines should be emphasized in infant care settings and be a focus for caregiver professional development, including pre- and in-service training. Although training related to diapering is often restricted to health concerns, the findings suggest that specific caregiver–child interactions during this care routine may support or hinder children's well-being and involvement in the moment. Caregiver responsiveness to children's cues in this context may enhance children's opportunities to practice involvement in bidirectional relationships and support children's well-being.

## KEYWORDS

care routines, diapering, caregiver–infant and toddler interactions

## 1 | INTRODUCTION

Research findings that inform program policies and practices and support the implementation of high-quality early care and learning environments for infants and toddlers are needed, especially for programs serving vulnerable young children (Yazejian et al., 2017). For children growing up in poverty, high-quality early care has been found

to buffer the effects of adversity associated with poverty (Horm, Norris, Perry, Chazan-Cohen, & Halle, 2016; Yazejian et al., 2017). A high percentage of infants and toddlers living in poverty are in nonparental care settings. In fact, nonparental care across all U.S. socioeconomic levels is common with 50% of infants and toddlers experiencing regular nonparental care an average of 33 h per week (Child Trends, 2013; Forry et al., 2018). These numbers are

alarming when paired with current research indicating that the quality of infant–toddler center-based care is generally in the low to mediocre range, with high-quality care being the exception (Lippard, Riley, & Hughes-Belding, 2016). Thus, these settings, and their impact on young children’s development, are important areas for scientific investigation.

Characteristics of process quality including caregiver–child interactions, relationships, and curriculum implementation are poorly defined in infant–toddler group care research (Phillips & Lowenstein, 2011). Deeper levels of understanding of the moment-to-moment interactions and experiences of young children are needed to inform caregiver professional development and to implement care practices that support children’s development. Acknowledging that 80% of a caregiver’s time is focused on daily care routines (Gonzalez-Mena, 1990), improving these day-to-day experiences of infants and toddlers in nonparental care becomes a priority.

### 1.1 | Proximal Processes of Person–Process–Context–Time

Guided by Bronfenbrenner’s (2001) Proximal Processes of Person–Process–Context–Time (PPCT), that focuses, in part, on the relationships and complex joint interactions between people and environments as drivers of development, we examine the quality of teacher–child interactions in infant–toddler group care. In this study, routines are viewed as frequent opportunities to offer high-quality interactions and facilitate child development. Through cumulative experiences, the proximal processes enacted in the moment-to-moment interactions of the diaper-changing routine provide a rich context for high-quality caregiver–child interactions. Approached from this perspective, the child is no longer a passive recipient in an unimportant care routine. Instead, diapering becomes a shared process where the child is actively involved “with” the caregiver and the caregiver’s behavior and responses matter. Critical to this shared process is the caregiver’s ability to “read and interpret the social and emotional cues of the child” and respond with sensitivity (Sabol & Pianta, 2012, p. 216).

### 1.2 | Importance of caregiver behaviors in infant–toddler group care

Caregiver interactions are an important feature in determining high-quality environments that support the healthy development of infants and toddlers (Howes & Spieker, 2008; Howes, Phillips, & Whitebrook, 1992; Norris

#### STATEMENT OF RELEVANCE TO INFANT AND EARLY CHILDHOOD MENTAL HEALTH

Because caregiver relationships are an essential part of infant mental health, this focus on specific components of caregiver behavior during a frequently occurring care routine provides unique evidence about everyday opportunities to support healthy child development. Specifically, caregiver responsiveness to children’s cues during diapering may enhance children’s opportunities to practice being involved in a bidirectional relationship and support children’s well-being. Encouragement provided by the caregiver is also important to foster child well-being.

#### KEY IMPLICATIONS AND FINDINGS

1. Observations of caregiver responsiveness and encouragement during diapering were related to child well-being. Responsiveness was also related to child involvement during diapering routines.
2. Results suggest that caregivers’ behaviors during diapering may be influential proximal processes in the moment-to-moment interactions between a caregiver and child.
3. Although training is often restricted to health concerns related to diapering, the findings suggest that specific caregiver–child interactions during this care routine may support or hinder children’s well-being and involvement in the moment.

& Horm, 2015a). The quality of interactions with infants and toddlers is influenced by the caregiver’s “beliefs and fundamental understanding of appropriate caregiving interactions” (Norris & Horm, 2015a, p. 87). Responding in a sensitive and timely way to the social overtures of infants and toddlers, for example, mirroring the child’s smiles, cooing, and eye contact, is important for fostering quality relationships with infants and toddlers in a back-and-forth style of communication (Norris & Horm, 2015a). Encouragement has been operationalized in research as supporting a child’s initiatives, independence, choices, and creativity (Norman & Christiansen, 2013). Researchers found that caregivers who encourage infants and toddlers

to take an active role in their own learning and their sense making of the world provided more cognitive stimulation in play and routine caregiving (Degotardi & Sweller, 2012). Positive caregiving was found to be one of the “strongest and most consistent predictors of children’s development” (HHS, 2006, p. 10). For example, positive caregiving reflected higher quality of care and better child outcomes. In the NICHD Study of Early Child Care (HHS, 2006), caregivers’ sensitive, encouraging, and frequent responsive interactions with infants and toddlers were associated with fewer behavior problems in preschool classrooms at age 3. Personal care routines are a major opportunity for caregivers to demonstrate responsiveness and encouragement to individual children in the group care context.

### 1.3 | Routines in infant and toddler care

Routines are viewed as an important component of the infant–toddler curriculum (Program for Infant/Toddler Care, 2018), and provide opportunities for caregivers to individualize care to accommodate individual differences, rather than adopt a one-size-fits-all, production-line approach (Gillespie, 2012). Despite the frequent opportunities routines provide for caregivers to promote high-quality interactions to support young children’s learning and development, routines are not given much attention in current measures of quality (Hallam, Fouts, Bargreen, & Perkins, 2016). Additionally, the majority of existing research on routines focuses on the preschool environment with scant information about infant and toddler individual experiences in nonparental care, despite the developmental significance of this period (Ramey & Ramey, 2004).

Although small, there is an emerging body of research examining routines in infant–toddler settings. Degotardi, Torr, and Nguyen (2016) examined caregiver’s use of language promoting practices with infants during snack time. Their findings are consistent with results from a study of caregivers of preschool-aged children revealing low-language-support teaching strategies during mealtimes (Bouchard et al., 2010). In another study, Degotardi (2010) found less caregiver involvement and less elaborate communication with children during diapering. Palmér et al. (2016), recognizing that diapering was one of the few one-on-one moments with a child in group care, examined the potential for interactions during diapering to communicate mathematical concepts. This emerging but scant research base signals the urgent need for more research examining caregiver pedagogical practices with infants and toddlers, especially focused on the role of care routines (Degotardi, 2010). To date, research attention on diapering has generally focused on hygienic protocols and disease

prevention in infant–toddler classrooms (Laurin & Goble, 2018).

### 1.4 | Dearth of literature on diapering interactions

As noted above, the current literature has few studies that describe interactions during diapering or investigate potential relationships with child outcomes. Although a recent study noted that mathematical concepts could be embedded within diapering interactions, the methods and results of the study focused on teachers’ mathematical language and teacher perceptions of math during diapering, but did not investigate child outcomes (Palmér et al., 2016). The most widely distributed U.S. state childcare licensing materials emphasize preventative infection control for handwashing and diapering protocols (Fiene, 1994). Other broad representations of quality, for example, the Infant/Toddler Environment Rating Scale-Revised (ITERS-R), focus on global constructs while missing important elements at the individual level between caregivers and children. For example, Personal Care Routines, a subscale of the widely used ITERS-R, measures hygienic and sanitary protocols in diapering and toileting with only one item focused on assessing “pleasant staff–child interaction” (Harms, Cryer, & Clifford, 2006). Classroom quality goes beyond health and safety and pleasant environments, with warm, sensitive bidirectional teacher–child interactions and appropriate experiences providing critical aspects of process quality (Norris & Horm, 2015a). These important features of caregiving routines and of the child’s social development require closer examination (Zaslow et al., 2006).

Due to the emphasis on health in diapering, with a dearth of literature on the interactions between adults and children during this one-on-one routine, more research exploring the quality of process variables is needed to contribute important information to the sparse body of infant–toddler group care research (Phillips & Lowenstein, 2011). Furthermore, understanding how process quality during care routines, including diapering, may impact children’s experiences and perceptions, especially at the individual level, is largely unexplored. Early infancy is a time of rapid change across the developmental domains where the frequency and features of care routines, including diapering, provide a platform for observing the direct responsiveness and consequences of the caregiver’s interactions with the child (Zaslow et al., 2006). High-quality, warm, and responsive caregiver interactions have a powerful influence on child outcomes (NAEYC, 2009; Norris & Horm, 2015b) and are known to mitigate the adverse effects of poverty for infants and toddlers in nonparental

care settings (Horm et al., 2016; Yazejian et al., 2017). Thus, we hypothesized that the quality of process variables of caregiver interactions during diapering would relate to children's experiences, especially in the social-emotional domain.

## 1.5 | Well-being and involvement

Diapering offers a bounded context for examining a child's social-emotional development including well-being and involvement with one-on-one caregiver interactions. As an outcome of quality of care, well-being and involvement during diapering are important because they provide a lens to examine the emotional and physical development of young children (Laevens, 2000). In the intimacy of diapering, a child's level of well-being and involvement are observable and provide a window into what the child is experiencing in the activity with a caregiver. For example, a caregiver's ability to follow a child's interest in clothing such as features of buttons and zippers, or a caregiver's invitation to choose between items of clothing such as two shirts or two diapers, facilitates involvement. Thus, learning is co-constructed in a participatory experience that supports involvement through meaningful encounters (Hedges & Cullen, 2012). Similarly, Seligman (2012) and Roberts (2010) argue positive emotions, a sense of satisfaction, and well-being are promoted when meaningful actions are available. Roberts (2010) suggests well-being is supported when "companionable learning" or "diagogy" occurs as two individuals interacting in a process of learning together are "jointly involved and focused" (p. 56). However, opportunities for caregivers to promote involvement in joint learning processes and respond to a child's initiative when there are opportunities for meaningful actions are often missed during care routines, and instead, the custodial elements of the care routine are emphasized (Degotardi & Davis, 2008).

Crucially, the process of involvement provides vital opportunities for individuals to refine and adjust meaning by exposure to the thinking of others and participation in some form of shared understanding with others (Degotardi, 2017). For example, in the diapering routine, a child motivated by his own sense of pleasure and agency at times reacts cooperatively with the caregiver's request or playfully departs from the requests (Vincze, 1994). Following the child's lead, the caregiver temporarily digresses from the diapering task to honor the child's interests. Similarly, effective caregiver-child interactions are characterized by shared interests (Horm et al., 2016) and meaning-making where ideas and knowledge "revolve around joint activity" (Degotardi, 2017 p. 410). An example in diapering might be a child pointing and expressing interest in the diapering

environment, the caregiver's clothing, or the patterns on the diaper with the caregiver responding with interest in the child's pointing by narrating the experience and encouraging the child's involvement. In this way, joint attention is tied to real and concrete interactions that are embedded in the moment-to-moment experiences of diapering.

Research focused on the role of well-being and involvement is needed to understand the beneficial practices supporting infant-toddler development in classroom settings. By measuring infant-toddler well-being and involvement, potential socioemotional problems are revealed at the earliest stage (Laevens & deClercq, 2018). Despite their potential importance, little research has focused on child well-being and involvement as important social-emotional variables, especially in the extant infant-toddler literature.

## 1.6 | The current study

The present study addresses the multiple gaps in the literature on process quality for infants and toddlers in classroom settings by focusing on the frequent daily routine of diapering. We examine relationships between important process quality features, specifically caregiver responsiveness and encouragement, and the child's experience of well-being and involvement, during the understudied routine of diapering. Based on previous evidence documenting the importance of classroom quality, we hypothesized that features of process quality would relate to child well-being. Additionally, we hypothesized that child involvement, as a manifestation of children's active participation, would also be related to higher quality caregiver-child interactions during diapering.

## 2 | METHODS

### 2.1 | Participants

Potential participants were recruited from 36 mixed-age infant-toddler classrooms across three sites of a high-quality childcare program serving low-income children in a mid-western city in the United States. After the recruitment and consent process, the study participants included 31 infant-toddler caregivers and 74 children, ages 3-37 months, in their care in 30 center-based classrooms.

All children enrolled in infant-toddler classrooms still requiring diapering, including children transitioning to toileting, fulfilled the inclusion criteria for this study. Children's parents were asked for their consent to allow their

child to be observed during diapering and for their administrative records to be accessed.

Staff consented to classroom observations and a record review through a related study. After the purpose and goals of this study were discussed with staff, they were asked to sign an additional consent to participate in this study that they understood involved observations of diapering encounters with children in their infant–toddler classrooms. The participating caregiver roles included: lead caregivers (48%), associate caregivers (29%), and assistant caregivers (23%). These roles, as defined by the setting, differ in the level of formal education. Lead teachers often held bachelor's degrees and had primary responsibility for lesson plans and supervision of classroom staff, in addition to the care of children. Associate caregivers typically had associate's degrees (2-year degrees) and participated in lesson planning, as well as caring for children. Assistant caregivers usually had a training certificate and their primary responsibility was care of children.

Two diapering cycles per child were observed with most children in the study. The majority of the children ( $n = 70$ ; 95%) were changed twice by the same caregiver in both diapering cycles. Four children were changed once. The final sample of 31 caregivers and 74 children included 144 separate observations of diapering cycles.

## 2.2 | Procedures

The study was approved by the university's institutional review board and the administrators of the participating childcare centers. As indicated above, active consent was secured prior to data collection from both infant–toddler classroom staff and parents of the children. Relative to data collection methods, child and caregiver characteristics including race, age, gender, and caregiver's role were collected through a review of existing records. Diapering interactions were observed using standardized measures. Observers were trained, as described in more detail below prior to data collection.

Each diapering cycle was observed by two trained observers—with one observing the caregiver's interactions and the other observing the child's well-being and involvement. Observers stood next to each other to have the same view of the caregiver–child dyad during diapering. Using stopwatches, the two observers began timing the observation when the child was called to or taken to the diapering area and timing ended after the child's hands were washed. Similarly, observations of the caregiver and child began when a caregiver signaled or selected a child to diaper; at this point, the researchers would follow the caregiver and child to the diapering area. Each child was observed twice,

typically in the morning on the same day. If this was not possible, the second diapering observation was completed by the researcher and research associate upon the child's return to the program the next day or as soon as possible.

## 2.3 | Measure of caregiver interactions

### 2.3.1 | The Parenting Interactions with Children: Checklist of Observations Linked to Outcomes

The Parenting Interactions with Children: Checklist of Observations Linked to Outcomes (PICCOLO) measures process quality through four behavioral domains of caregiver interactions with children including affection, responsiveness, encouragement, and teaching (Roggman et al., 2013). It is a 29-item checklist of behaviors using a 3-point scale across the four domains. Observers rate caregiver interactions as 0 (*absent*), 1 (*barely*), or 2 (*clearly*) observed. The ratings are summed to determine the overall score per domain. The PICCOLO has been validated as a measurement of caregiver interactions with children in nonparental care (Lippard et al., 2016; Roggman et al., 2013).

Observers were trained on the PICCOLO prior to data collection. Two study researchers read training manuals and reviewed training videos over a 2-week period. Next, for further practice, the researchers visited a community childcare site not involved in this study to live code diapering routines in infant–toddler classrooms. Coding reliability was established prior to data collection with interrater agreement of at least 85% on PICCOLO item criterion during a series of four live coding sessions in the nonstudy community childcare classrooms. Researchers discussed their scores and were within the PICCOLO author's criterion of no more than 2 points difference in item scoring on any one item. These nonparticipating training sites also allowed calibration checks during the study. Three separate calibration checks were completed to ensure assessor reliability over the 14 weeks of data collection at weeks 4, 9, and 11.

In other studies using this measure, estimates of internal consistency range between .41 and .78 for the four scales (Affection  $\alpha = .55$ , Responsiveness  $\alpha = .78$ , Encouragement  $\alpha = .76$ , and Teaching  $\alpha = .41$ ). In this study, only the scales for responsiveness and encouragement met minimal internal consistency levels of .70 considered acceptable for exploratory research (Nunnally, 1978). Thus, affection and teaching were dropped from analysis. Responsiveness and encouragement subscales were retained for analysis and are described below.

### *Responsiveness*

This subscale evaluates how well caregivers read children's cues and responded to them. There are seven items that can be rated 0, 1, or 2; thus, the subscale scores can range from 0 to 14. The individual items address the attention caregivers give, the pacing of interactions, and the flexibility of the caregiver to the child's needs. Highly responsive caregivers will be observed "following the child's lead."

### *Encouragement*

This subscale evaluates the extent to which caregivers are supportive of the child's actions. It consists of seven items, each scored 0, 1, or 2, with subscale totals ranging from 0 to 14. Indicators of high encouragement include giving the child meaningful choices and waiting for a response from the child. Highly encouraging caregivers will be seen to support and elicit child autonomy.

## **2.4 | Measure of child well-being and involvement**

### **2.4.1 | The process-oriented self-evaluation instrument for care settings**

The process-oriented self-evaluation instrument for care settings (PSIC) measures the two constructs of child well-being and involvement on a 5-point scale (Laevens et al., 2005). The measure was originally developed as a self-assessment tool for caregivers to reflect on their own classroom practice. To reduce threats to validity associated with relying on self-report, the measure's developer modified the PSIC to be an observational tool.

Training and reliability certification on this measure was completed at the Center for Experiential Education during a 3-day workshop at the Catholic University (KU) in Leuven, Belgium. During this training, a study researcher coded 25 videos resulting in the required minimum of .70 reliability for Well-being and Involvement, as determined by the scale's developers.

### *Well-being*

Well-being is defined as a feeling of ease, spontaneity, and a lack of emotional tension. Indicators of high well-being include smiles, spontaneous expression of sounds/language, and relaxation/lack of tension in the muscles. Indicators of low well-being include signs of discomfort, attempts to self-soothe, and facial expressions of sadness and anger. Observations of child well-being were rated on a 5-point scale with ratings ranging as follows: 1 (*Extremely low*), 2 (*Low*), 3 (*Moderate*), 4 (*High*), and 5 (*Very high*). A single well-being rating was recorded as the score for each diapering session observed, and thus inter-

nal consistency could not be calculated for Well-being in this study.

### *Involvement*

Laevens (1998), a PSIC author, characterized involvement as the quality of activity occurring in the child's zone of proximal development where a child's intrinsic motivation finds expression through actions on the environment and with people. Involvement is the capacity to be deeply absorbed in activities with concentration and interest. At the low end of involvement, a child will show very little activity; at the high end of involvement, the child will be continuously engaged, without interruption, and be absorbed in the activity. Each child observation was individually scored at the end of the diapering observation period, when a child's hands were washed and the child left the diapering area and returned to the main classroom. Using a 5-point scale, the researcher recorded the involvement score selecting from 1 (*Extremely low*), 2 (*Low*), 3 (*Moderate*), 4 (*High*), and 5 (*Very high*). A single involvement rating was recorded as the score for each diapering session observed. For both Well-Being and Involvement, internal consistency cannot be calculated for these measures because they are single items.

## **2.5 | Data analysis plan**

Multilevel modeling was used to account for multiple observations of children and caregivers (Hox, 2010). The data were structured with three levels—with observations as the first level, nesting observations within children at the second, and nesting children within caregivers at the third. At level 1, we included the observations of each caregiver and child, with one researcher observing the teacher with the PICCOLO and one researcher observing the child with the PSIC. Observers were not part of the model, because the same two observers conducted all observations. Covariates, including gender, age, race, and site, were independent variables at level 1, controlling for variance of these characteristics. Child age was not considered as a time-varying characteristic because observations were conducted within a short time frame of 1–2 days.

The nonindependence of multiple observations of children was accounted for at level 2, nesting multiple observations of each child within individual children. The nonindependence of multiple children interacting with each caregiver was accounted for at level 3, nesting children within the caregiver with whom they interacted.

Using these multilevel models, associations among caregiver interactions, child well-being, and child involvement were analyzed through a series of regression models. The

models included (1) the relationship of responsiveness and encouragement with child well-being and (2) the relationship of responsiveness and encouragement with child involvement. After establishing the need to conduct multilevel analysis by examining the proportion of variance attributable to observations, the two multilevel regression models were tested.

Analyses were conducted with the following equations:

$$Y_{(\text{well-being})jk} = \gamma_{000} + \gamma_{(\text{responsiveness})jk} + \gamma_{(\text{encouragement})jk} \\ + \gamma_{(\text{age})jk} + \gamma_{(\text{Black})jk} + \gamma_{(\text{White})jk} \\ + (\text{Hispanic}) + (\text{male}) + (\text{site A}) \\ + (\text{site B}) + \nu_{0k} + u_{0jk} + e_{ijk} \quad (1)$$

and

$$Y_{(\text{involvement})jk} = \gamma_{000} + \gamma_{(\text{responsiveness})jk} + \gamma_{(\text{encouragement})jk} \\ + \gamma_{(\text{age})jk} + \gamma_{(\text{Black})jk} + \gamma_{(\text{White})jk} \\ + (\text{Hispanic}) + (\text{male}) + (\text{site A}) \\ + (\text{site B}) + \nu_{0k} + u_{0jk} + e_{ijk} \quad (2)$$

Each equation estimated an intercept-only model for levels two and three, with all observations of child-caregiver dyads, as well as child characteristics, treated as fixed effects and child and caregiver intercepts estimated as random effects. Statistical significance was determined by an alpha level of .05 or lower.

Descriptive statistics were calculated for the primary measured variables.

### 3 | RESULTS

#### 3.1 | Preliminary analyses

Preliminary analyses were completed to summarize the characteristics of the participants and diapering routine and to check the assumptions underlying the planned multilevel modeling. These preliminary results are presented below.

##### 3.1.1 | Characteristics of the participants

The child sample was 47% female and 53% male; 32% Black, 18% White, 39% Hispanic, and 11% identified as other race/ethnicity. Data on child race and ethnicity were missing for 1% of children. Children's ages ranged from 3 to 37 months, with a mean age of 21.8 months ( $SD = 8.9$ ).

Administrative data were missing for 63% of caregivers because their data could not confidently be linked with the larger study. All caregivers in this study agreed to provide access to their administrative data, but a linking variable was not established prior to data collection. Thus, researcher knowledge of the staff was used to link administrative data. Where there was not clear data (e.g., same classroom, race, and education level) that linked a participant to the administrative dataset, demographic data are missing.

For the 19 caregivers with demographic data, all were female and all spoke English as their primary language. Their racial backgrounds included 26% Black, 68% White, and 5% Native American. The education levels ranged from high school/General Equivalence Diploma (GED) to Master's degree with 5% having a high school diploma or GED, 5% having some college, 5% completing a 1-year degree, 21% completing a 2-year degree, 42% completing a Bachelor degree, and 21% completing a Master's degree. Caregiver ages ranged from 23 to 60 years of age, with 32% between 23 and 32 years, 32% between 33 and 42 years, 5% between 43 and 52 years, and 32% between 53 and 60 years of age. Caregivers reported having between 1.9 and 30 years of experience with a mean score of 8.9 ( $SD = 7.1$ ). Based on familiarity with this program and demographic data from the larger, ongoing study, the caregiver demographic information for this substudy on diapering is similar to the characteristics of the entire caregiving staff.

##### 3.1.2 | Characteristics of the diapering routine

The duration of the first and second diapering interactions was timed. Observers began timing the diapering routine when the child entered the diaper changing area and stopped timing when the child returned to the main classroom. Handwashing was typically conducted in the diaper changing area and was therefore timed as part of the diapering routine. The mean duration of Diaper Change 1 was 3:20 min ( $SD = 1:14$ ), ranging from 0:49:00 s to 9:06 min. The mean duration of Diaper Change 2 was 4:24 ( $SD = 1:26$ ), ranging from 1:06 to 10:23 min. Taken together, across the two diaper changes, the grand mean was 3.52 min ( $SD = 1:20$ ).

##### 3.1.3 | Descriptive statistics on ratings

Ratings of caregiver responsiveness and encouragement ranged from 0 to 14 and 0 to 12, respectively. The mean score of responsiveness was 8.8 ( $SD = 3.2$ ). The mean score of encouragement was 6.0 ( $SD = 3.2$ ). The scores of child well-being ranged from 1 to 5, with a mean of 3.6 ( $SD = 1.1$ ).

**TABLE 1** Correlations of caregiver and child variables

Measure	1	2	3	4
1. Child well-being	–			
2. Child involvement	.75**	–		
3. Caregiver responsiveness	.48**	.51**	–	
4. Caregiver encouragement	.50**	.56**	.55**	–

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

Child involvement scores ranged from 1 to 5, with a mean score of 2.9 ( $SD = 1.1$ ).

Correlations among these caregiver and child ratings are shown in Table 1. The results reveal moderate to large correlations among the variables. Correlations between most variables were close to .50 or lower. However, the correlation between child well-being and child involvement was quite high (.75), indicating that the two variables may be capturing aspects of the same construct (Ruel, Wagner, & Gillespie, 2016). This is not surprising, as the ratings originate from the same measure and were provided by the same observer.

### 3.1.4 | Other preliminary analyses

Data were examined for outliers and normality. No outliers were found that indicated the need for additional analysis. All scores were within acceptable ranges with skewness being below an absolute value of .80 and kurtosis being below an absolute value of 2 (Howell, 2007).

Intraclass correlations (ICCs) were calculated as an indication of the proportion of variance that can be explained by the model (Hox, 2010). The ICC for the observation level was 40%, the child level was 42%, and the caregiver level was 18%. The likelihood ratio test comparing an ordinary least squares regression to the unconditional multilevel regression was significant,  $\chi^2(2) = 37.95$ ,  $p < .05$ . This indicated that the data were appropriate for a multilevel model. The unconditional model for child well-being is shown as M0: Intercept only in Table 2. Similarly, the unconditional model for child involvement provided evidence of the appropriateness of multilevel modeling. Random effects error terms are shown in Table 3 as Model 2 (M2).

## 3.2 | Primary analyses

### 3.2.1 | Relationship of caregiver interactions with child well-being

The relationship between caregiver interactions and child well-being was first tested. The multilevel regression

**TABLE 2** Relationship of caregiving interactions with child well-being

Model	M0: Intercept only	M1: Child well-being
Fixed effects	Coefficient (SE)	Coefficient (SE)
Intercept	3.51 (.13)	4.02 (.30)
Responsiveness		.06 (.03)*
Encouragement		.09 (.03)**
Age in months		.00 (.01)
Black		-.14 (.28)
White		.34 (.34)
Hispanic		-.06 (.33)
Gender = male		-.22 (.17)
Site A		-.33 (.22)
Site B		-.68 (.25)**
Random effects estimates		
$\sigma_e^2$	.45 (.07)	.42 (.07)
$\sigma_{u0}^2$	.48 (.14)	.24 (.09)
$\sigma_{y0}^2$	.20 (.12)	.00 (.00)
Deviance (log likelihood)	-198.25	-169.71

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**TABLE 3** Relationship of caregiving interactions with child involvement

Model	M2: Intercept only	M3: Child involvement
Fixed effects	Coefficient (SE)	Coefficient (SE)
Intercept	2.87 (.13)***	3.49 (.27)***
Responsiveness		.09 (.02)***
Encouragement		.04 (.03)
Age in months		.04 (.01)**
Black		-.49 (.25)
White		.05 (.30)
Hispanic		-.37 (.29)
Gender = male		-.25 (.15)
Site A		-.05 (.21)
Site B		-.45 (.23)
Random effects estimates		
$\sigma_e^2$	.41 (.07)	.39 (.07)
$\sigma_{u0}^2$	.50 (.15)	.13 (.09)
$\sigma_{y0}^2$	.18 (.13)	.03 (.06)
Deviance (log likelihood)	-194.49	-158.34

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

model included responsiveness and encouragement, as well as all covariates, as independent variables and child well-being as the dependent variable. Both responsiveness ( $\beta = .06$ ,  $p < .05$ ) and encouragement ( $\beta = .09$ ,  $p < .01$ ) were modestly but significantly related to child well-being. The



analysis indicated that higher responsiveness and encouragement were each positively related to child well-being. Standardized coefficients and standard errors are shown as M1: Responsiveness and Encouragement in Table 2.

### 3.2.2 | Relationship of caregiver interactions with child involvement

The relationship between caregiver interactions and child involvement was tested in model 3. The multilevel regression model included both responsiveness and encouragement as independent variables and child involvement as the dependent variable. The results indicate that responsiveness was related to child involvement ( $\beta = .09, p < .001$ ). However, encouragement did not have a statistically significant relationship with child involvement. The model is shown as M3: Responsiveness and Encouragement in Table 3. This indicated that responsiveness contributed more to the variance of child involvement than encouragement.

It is important to note the variance attributed to age in the analysis of child involvement. Specifically, age was significantly related to child involvement, indicating that older children were more highly involved in the care routine. For example, encouragement was observed when caregivers encouraged children's autonomy by giving children meaningful choices and demonstrating interest in the child's participation by waiting for responses from the child. This indicates that there are differences in caregiver interactions by child age.

## 4 | DISCUSSION

The purpose of this study was to examine relationships between caregiver interactions and the extent to which children were comfortable and engaged during diapering. Caregivers who were observed following children's leads, reading their cues, and being flexible to their needs represented high responsiveness. The children involved in dyads with highly responsive and encouraging caregivers were more likely to be restful and calm, as measured by the child well-being rating. These children were also slightly more likely to be engaged and active, as measured by child involvement.

Caregivers who were observed giving children choices, waiting for children to respond, and supporting children's autonomy rated high on encouragement. Children involved in dyads with these caregivers were also slightly more likely to have higher well-being ratings, even after accounting for variance attributed to caregiver responsiveness. However, encouragement did not have a statistically

significant relationship with child involvement. This may suggest that caregivers need a better understanding of the use of encouragement to support a child's initiatives, choices, independence, and participation in the diaper routine.

The findings of this study contribute information about the potential of diapering, a frequently occurring care routine, to serve as an opportunity for high-quality teacher-child interactions within the context of infant-toddler group care. In sum, the findings of this empirical research address the gap in process variables at the individual level in infant-toddler nonparental care and provide new information for elevating the importance of care routines, testing the hypothesis that caregiver interactions support child well-being and child involvement.

This study is unique in its focus on diapering, not restricted to health indicators alone, but as an opportunity for caregivers in group care settings to have rich one-on-one interactions. Other research has revealed the lack of caregiver focus on interactions during diapering. For example, Degotardi and Davis (2008) found that caregiver's interpretations about diaper-changing practices with infants and toddlers were significantly and qualitatively different from other interactions throughout the day with infants and toddlers, specifically play. Degotardi and Davis suggested that the limited talk during routines is attributed to a number of possibilities including caregiver embarrassment and self-consciousness, a lack of knowledge and experience about how to interact during care routines, and a lack of awareness about the importance of sensitive interactions to support optimal healthy development with infants and toddlers (Norris & Horm, 2015a). However, this and other research indicates that the support of child involvement and caregiver responsiveness are important. Constrained by the challenges of caring for multiple children, many caregivers find opportunities to be responsive to a child even if only for a few brief moments during diapering. When done consistently, these interactions can fulfill a need for moments of shared mutual activity. This study uniquely identifies an opportunity for caregivers to support well-being and involvement through the use of diapering routines as an important time for responsive interaction and children's participation in the routine.

### 4.1 | Strengths and limitations

There are several limitations inherent in this study. First, causality cannot be established due to the correlational design of this study. Second, the study sample was recruited from a single program in the Midwest, with families self-selecting into the program. Additionally, this program is known for implementing high-quality practices

with highly trained caregivers further limiting the generalizability to typical group care settings. The caregiver participants in this study have frequent access to professional development, and lead caregivers typically have a Bachelor's degree. This level of training and education is not typical of the broader infant and toddler caregiver population. Third, although the majority of families consented to participate in the study, a few families declined, potentially adding to selection bias.

Measurement limitations warrant consideration. The measure of caregiver interactions, the PICCOLO, had low levels of internal consistency on two of its four dimensions limiting exploration of all aspects of caregiver interactions to responsiveness and encouragement. Additionally, because the measure of child behavior yielded a single global score of well-being and involvement, the evaluation of the PSIC's internal consistency was not possible. Although the PSIC is a unique assessment of how children interact with their caregivers and surroundings to fulfill their needs as active participants (Laevers & Declercq, 2018), further development of indicators and psychometric soundness is warranted. Two different observers who coded for the PICCOLO and the PSIC remained consistent throughout the study. Due to logistical and space limitations in the diaper change area, the PSIC coder was not separated from the PICCOLO coder reducing the opportunity for independence of the researcher's observational ratings. Although interrater reliability for the PSIC was established through training prior to data collection, calibration was not possible to assess during data collection due to just one observer being trained on the measure. As noted previously, calibration for the PICCOLO was conducted before, during, and after data collection at each of the three study childcare sites as a way to mitigate this limitation for one of the two observational measures.

Despite these limitations, this study offers many strengths in addition to its contribution of new information about diapering as an opportunity for rich caregiver-child interactions at the proximal level. Design strengths include the use of multiple observers—one for the child and one for the caregiver—to reduce shared method variance and increase validity of results. Importantly, the reliance on observational data collection reduced dependence on self-report measures that have known problems (Furnham & Henderson, 1982) but are common techniques.

The study also incorporated a measure unique to one-on-one interactions in group care research. Developed from attachment literature, the PICCOLO emphasizes interactions at the individual level, similar to PPCT theory that promotes attention, action, and timely responses in the moment-to-moment interactions between a caregiver and child (Bronfenbrenner, 2001). This is important in

research of group care because studies suggest that allowing time for child led interactions where the caregiver and child are mutually and reciprocally involved is associated with high-quality care (Zaslow et al., 2006).

Methodological strengths include the use of multilevel modeling to address the nested data. This study also had a unique population of study participants—children from low-income families and their caregivers. This population is important to study, as few infants and toddlers living in poverty have access to high-quality care (Ruzek, Burchinal, Farkas, & Duncan, 2014), which, as noted, was the context for this study.

## 4.2 | Implications and future research

Addressing the unique needs of young, at-risk children in infant-toddler nonparental care settings is of national and global importance. This research has several implications for practice and policy and is a response to the call for research exploring process variables and teacher competencies in infant and toddler classrooms (Yazajian et al., 2017; Chazan-Cohen et al., 2017).

This study contributes important quantitative findings to inform early childhood educators and policymakers about how to enhance infant and toddler educational practices that support child well-being (Degotardi et al., 2016; Hallam et al., 2016; Chazan-Cohen et al., 2017). Vital to the discussion of quality is the nature of care at the proximal level in infant and toddler childcare environments. This study focused on the quality of interactions that occur during the frequently occurring diapering routine. This has important implications for infant and toddler care because a young child's day evolves around the anchored moments of caregiving routines. Thus, diapering and other routines offer ideal contexts for embedding opportunities for learning, acting on the child's interests and activity, and for development beyond the scope of play (Degotardi & Davis, 2008). As noted by Chazan-Cohen et al. (2017), infant-toddler learning is uniquely situated within the context of secure attachments, trusting relationships, and responsive caregiver interactions.

A number of researchers and professional organizations advocate for and emphasize the importance of individualized care routines (e.g., Copple, Bredekamp, & Koralek, 2013; NAEYC, 2012; Zero-To-Three, 2008) but important information about the specific elements of routines including diapering is missing in the available literature. Literature on developmentally appropriate practices highlights diapering as an opportunity for inviting an infant's attention and cooperation in the experience to build a sense of teamwork (Copple et al., 2013; Laurin & Goble, 2018), but lacks specific guidance on how to promote attention,

cooperation, and involvement. Ideally, diaper changing offers key opportunities for caregivers to act on a child's motivational impulses and to aid a child's acquisition of competences.

However, the observed fast-paced, diapering practices mostly adhere to hygienic and custodial practices with squandered opportunities for relationship building and crucial embedded language and learning experiences derived from the child's interests (Laurin, 2018; Laurin & Goble, 2018). Instead, limited caregiver interactions and talk, an emphasis on instructional content, and directing child behaviors during caregiving routines are the norm (Degotardi, 2010). Venn and Wolery (1992), among others (Degotardi & Davis, 2008), highlight the need for research specifically targeting caregiver training on how to interact during care routines with infants and toddlers and to address the lack of specific training about infants and toddlers in higher education early childhood programs (Chazan-Cohen et al., 2017; Horm, Hyson, & Winton, 2013). Crucially, this research can substantially influence caregiver training and professional development by addressing the undervalued role of diapering routines in individual caregiver-child interactions that influence child well-being and involvement.

#### 4.2.1 | Preservice teacher preparation

Critical to the long-term positive outcomes for this age group is a workforce equipped with the knowledge and skills to work with infants and toddlers (Chazan-Cohen et al., 2017). Most early childhood programs in higher education lack specific training about infants and toddlers (Horm et al., 2013). For example, findings from a national survey (Early & Winton, 2001) revealed only 29% of U.S. colleges and universities offered curriculum content targeting children under 4, and only 40% of U.S. colleges and universities offered an infant and toddler course. In 2006, that number increased to 46% of programs offering course content on infants and toddlers (Maxwell, Lim, & Early, 2006). As a vital component of curriculum, preservice programs could include additional focus on how to create environments and experiences based on the individual interests and abilities of the child versus prescribed, scripted, instructional interactions (Chazan-Cohen et al., 2017). Addressing routines, especially diapering, is critical material to cover for pre-and-in-service professional development.

#### 4.2.2 | Inservice training

Emphasis on theory-to-practice highlights collaborative care where a holistic approach to infant and toddler devel-

opment across the developmental domains is informed by current research (Horm et al., 2016; McMullen & McCormick, 2016). Promoting a child's involvement in diapering requires re-thinking caregiver training to view diaper changing beyond custodial and efficiency-based practices. As reported in this study, caregivers who were observed following children's lead, reading their cues, and being flexible to their needs were more likely to have highly involved children during diapering routines. Sabol and Pianta (2012) suggested that in-service caregiver training focusses on high-quality relationship-based practices because central to the caregiver-child relationship is the caregiver's ability to accurately interpret a child's social and emotional cues. Venn and Wolery (1992) focused on in-service training with caregivers to engage in positive interactive behaviors with infants during diapering and feeding routines in infant childcare programs. Caregivers were trained in game playing interactions with the infants, received feedback on their interactions, and watched videotapes of their diaper-changing interactions in the classroom. Subsequently, infants in the study began to initiate game playing with their caregiver during diaper-change routines. Although not directly measured, the researchers posited that caregivers appeared more attentive and responsive to infant cues as a result of the training and video feedback (Woods & Kashinath, 2007).

For children at risk and living in poverty, how a caregiver approaches diaper changing has implications for child well-being and involvement. For example, a caregiver who interprets the unique verbal and nonverbal behaviors of infants and toddlers, changes pace in response to the child's needs, responds with delight and encouragement for the child's effort to do things on his or her own, and shows understanding acceptance of a child's emotions is actively supporting collaborative care and the child's developing self (Laurin, 2018). The potential of interactions during a routine such as diapering to contribute to children's social-emotional development is an important message to convey in professional development.

## 5 | CONCLUSION

Ensuring that infants and toddlers flourish and thrive in infant-toddler classrooms, rather than just survive (McMullen & McCormick, 2016), requires examination of features of process quality. Diapering, although a frequently occurring routine in infant-toddler care, has not been examined or thought of as a meaningful component of quality. This study shows that the structured nature of the diapering session presents a unique opportunity to investigate caregiver-child interactions and the child's well-being and involvement. Additionally, the results of this study suggest that diapering routines be re-examined

and elevated as a vital element in the moment-to-moment interactions between a caregiver and child and be viewed as an essential proximal process (Bronfenbrenner, 2001). Both theory and research document the critical importance of responsive caregiver–child interactions to child outcomes (Horm et al., 2016; Norris & Horm, 2015b). However, for the 144 diapering observations of this study, valuable opportunities for meaningful encounters were frequently missed in the fast pace of the diapering routine (Laurin, 2018), substantiating Degotardi's (2010) findings that caregivers have lower expectations for promoting quality interactions during diapering. Eclipsed by the custodial demands of diaper changing, caregivers rarely diverge from the hustle–bustle of the day to slow down and build on the child's curiosity and interest with encouragement and responsiveness. These research findings indicate that higher levels of caregiver responsiveness and encouragement may support child well-being and involvement in the context of diapering. This suggests that professional development specifically addresses diapering as a context or opportunity for meaningful caregiver–child interaction.

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#### CONFLICT OF INTEREST

Each named author has contributed to the underlying research and writing of this manuscript with no conflict of interest, financial or otherwise.

#### ETHICS APPROVAL

This research was approved by the University of Oklahoma Internal Review Board (IRB) and the Executive Directors of the childcare settings.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

#### AUTHOR CONTRIBUTIONS

Deborah Laurin designed the study and coded the data, substantially contributing in preliminary research analyses, interpretation, and writing the paper. Shannon Guss was responsible for additional statistical analyses and writing the findings. Diane Horm made essential contributions in writing and finding discussions.

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