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Emotional Availability and Touch in Deaf and Hearing Dyads

In recent years, increasing attention has been given to the development of deaf children, though few studies have included Deaf parents. The present study examined emotional availability (EA) and functions of touch used by Deaf or hearing parents with hearing or deaf infants during free play. Sixty dyads representing four hearing status groups were observed when the infants were 18 months old. Comparisons among all four groups revealed significant differences in regard to parental sensitivity and child responsiveness, with hearing mothers with deaf infants tending to score lowest in the various subcategories of EA. Significant differences were also found for *attentional* touch and *total* touch, with deaf mothers of deaf or hearing infants using both types of touch more than hearing mothers of deaf or hearing infants. The importance of support and interventions for hearing mothers with deaf infants is discussed.

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Of the approximately 5,000 deaf children born each year in the United States (Thompson et al., 2001), more than 90% are born to hearing parents (Marschark, 1993b). In order to understand the development of these children, it is sometimes informative to consider the 10% born to Deaf parents as models for comparison with hearing parents of deaf infants, and as examples of communication patterns that might be helpful in terms of intervention strategies.

In 1987, researchers at Gallaudet University began a large-scale longitudinal study of the early social, cognitive, and communicative development of deaf children (Meadow-Orlans, Spencer, & Koester, 2004).[1] Prior to this, few studies had been published on deaf children younger than the age of 2 years (Meadow-Orlans, Erting, & Moores, 2004). In addition to including data collected on infants at ages 6, 9, 12, 15, and 18 months, this dataset is unique in its inclusion of Deaf parents and their infants.

In the present article, we first summarize the literature related to deafness in the context of parent-child communication in the early years, placing particular emphasis on two important aspects

of maternal behavior: (a) emotional responsiveness and availability and (b) touch as a component of communication with special relevance for deaf children. The inspiration for this study was an investigation by Pipp-Siegel, Blair, Deas, Pressman, and Yoshinaga-Itano (1998), who looked at EA and touch among *hearing* mothers with their hearing or deaf infants.

Deafness and Parent-Infant Communication

Communication with any infant requires acquiring and maintaining the baby's attention, but for deaf infants, visual attention is particularly critical. In the contemporary industrialized world, many deaf/hard of hearing (D/HH) children are able to take advantage of sophisticated technology that allows them much better access to sounds—including speech—than was previously the case. The result, compared to when earlier studies were first initiated, is that these children are now more likely to develop oral communication skills and may rely less on signed communication. However, it is important to note that the National Association of the Deaf (2000) has stated that "cochlear implantation is a technology that represents a tool to be used in some forms of communication, and not a cure for deafness." Additionally, not all children who are D/HH are eligible for or receive cochlear implants. Bradham and Jones (2007) observed that only 55% of children who are candidates for the procedure actually receive implants. Thus, regardless of recent technological advances, visual attention remains an important aspect of D/HH children's social and linguistic environments, and fostering it is an important consideration regardless of parental hearing status and decisions about communication mode.

Deaf parents are more likely than hearing parents to be sensitive to the visual communication needs of a deaf infant (Vaccari & Marschark, 1997), and may intuitively understand the need to use attention-getting strategies, such as tapping the child or waving within the child's visual field, before initiating signing (Swisher, 2000). Hearing parents, especially those without previous experience with people whose hearing is limited, are less likely to be accustomed to incorporating such strategies into their interactions and may therefore unintentionally miss their deaf infant's communicative efforts. As Jamieson (1994) stated, "It appears that hearing adults, both parents and teachers, face a tremendous challenge in trying to unlearn habitual communication patterns and to replace them with patterns more appropriate to the visual mode" (p. 446).

In the event that hearing parents do try to adjust their strategies, they sometimes do so in "intrusive ways, such as turning the child's face toward them" (Mohay, 2000, p. 154). Even if hearing parents decide to learn sign language, it will take some time until they are not only fluent, but also comfortable using a visual-gestural language and understanding its communicative nuances. In contrast, Deaf parents may have an intuitive understanding of their deaf child's sensory needs and of the child's need to gain access to many aspects of communication through visual and tactile modes (Koester & McCray, 2011). Again, there may be important implications here for all parents of D/HH children, even in cases in which the emphasis is on auditory input and the development of spoken language.

Emotional Availability (EA)

Emotional availability (EA) describes the supportive presence of a mother that encourages her child to explore the world (Biringen & Robinson, 1991). Although similar conceptually, EA incorporates a wider range of contexts than attachment theory (Easterbrooks & Biringen, 2000), as it is a dyadic construct that includes the child's responsiveness and involvement during an interaction.

Deafness and Emotional Availability

Children learn to understand and identify their feelings verbally through interactions with their parents (Barton & Brophy-Herb, 2006). In EA terms, this is sensitivity. In general, sensitive and responsive parenting exerts a positive influence on language development, regardless of a child's hearing status (Pressman, Pipp-Siegel, Yoshinaga-Itano, Kubicek, & Emde, 1998). Pressman, Pipp-Siegel, Yoshinaga-Itano, and Deas (1999) found that maternal sensitivity predicted language gains by preschool children with hearing loss, even when the differences between children and families in initial child language level, mode of communication, severity of child hearing loss, and maternal education were controlled for. This finding is important, as children who are D/HH with hearing parents have often shown language delays and deficits when compared to such children with Deaf parents. Thus, as Pressman et al. (1998) have asserted, D/HH children with hearing parents may be particularly in need of sensitive parenting. Clearly, with the increased availability of cochlear implants and highly sensitive hearing aids, fewer such delays are expected for those children fortunate enough to have access to these advances. Nevertheless, as with all infants, sensitive parental interactions can only be an asset, particularly in cases in which the child has a sensory limitation.

However, much of the literature on interactions between hearing mothers and their D/HH children indicates that hearing mothers may be more rigid,

intrusive, and negative toward these children than is the case in hearing mother-child dyads (Pipp-Siegel & Biringen, 1998; Pressman et al., 1998). Hearing mothers with deaf infants have been observed to be more physically directive, playing "a far more active, if not intrusive role in their children's day-to-day behaviors than mothers of hearing children" (Marschark, 1993a, p. 15). Many studies have found hearing mothers to comment on and respond *less* to their D/HH child's focus of attention or topic choice and to praise less frequently than mothers in dyads matched for hearing status (Pressman et al., 1998). Not only is there less interaction within these hearing mother/deaf child dyads, but the children are often less responsive, active, and involving (Pipp-Siegel & Biringen, 1998; Pressman et al., 1998).

Parent-infant interactions are complex and multifaceted regardless of hearing status. Communication is intricately intertwined with EA and can be perceived via multiple modalities, including touch. For deaf infants, the role of tactile contact assumes greater importance as a component of early social interactions.

Touch

The skin is the largest and earliest-maturing sensory system of the human body. Tactile contact is an important part of early development and serves many interactive functions, such as comforting, calming, soothing, and maintaining alertness (Stack & Muir, 1992). Touch contributes to an infant's overall health, emotional development, physical growth, self-regulation, and social responsiveness (Eliot, 1999; Jean & Stack, 2012; Stack & Muir, 1992; Tronick, 1995). However, one of the less frequently explored roles of touch is that of communication (Stack & Muir, 1992). Not only is the sense of touch highly developed at birth, but the newborn has more somatosensory nerve endings than an adult, which means that the infant is "particularly *receptive* to touch as a language of communication with social partners" (Koester, Brooks, & Traci, 2000, p.127). Moreover, maternal touch changes in relation to the infant's age and interaction context, reinforcing the idea that touch may be used differently depending on the environment and/or dyad (Jean & Stack, 2009; Jean, Stack, & Fogel, 2009).

In regard to the deaf population, parental use of highly salient sensory channels helps the deaf child learn to communicate effectively and according to the expected developmental trajectory. Understanding that touch is an important component of early communication may require more conscious effort on the part of hearing parents as they learn to help the child coordinate attention between objects and social partners (Koester et al., 2000; Waxman & Spencer, 1997). Nevertheless, hearing mothers with deaf infants have been found to use more gestural and tactile communication than hearing mothers with hearing infants (Spencer, 1993), and thus to communicate and interact with their infants in both verbal and nonverbal ways. Additionally, Pipp-Siegel et al. (1998) found that hearing mothers' use of touch increased with the severity of their infant's hearing loss. This indicates that hearing parents are able to accommodate to the deaf infant's sensory needs, although some instruction or intervention may be needed to encourage this.

Rationale of the Study

The purpose of the present study was to expand on a previous study by Pipp-Siegel et al. (1998) that examined the frequency of touches as well as EA in 48 hearing or D/HH children (ages 14–29 months) with their *hearing* mothers; no Deaf mothers were included. In summary, Pipp-Siegel et al. found more use of touch and more structuring of play by mothers of D/HH children; this greater amount of touch was also associated with a lower level of maternal sensitivity in their sample of hearing mothers.

The present study modeled the work of Pipp-Siegel et al. (1998) by examining the relationship between touch and EA in *both* Deaf and hearing mother-infant dyads during a 10-minute free play interaction; infants in this sample were all 18 months old (± 2 weeks). The study extended the previous one by including the *function* of touch rather than just its frequency or quantity.

Method

Background

The original database resulted from a longitudinal project investigating the impact of early deafness on the cognitive, social, and communicative development of deaf and hearing infants with their Deaf or hearing mothers in the first 18 months of the child's life. The dyads were grouped according to hearing status: (a) Deaf parents/deaf infant (D/d), (b) hearing parents/deaf infant (H/d), (c) Deaf parents/hearing infant (D/h), (e) Hearing parents/hearing infant (H/h).

Participants

Participants in the Gallaudet Infancy Study were predominantly from Caucasian, middle-class, college-educated families, with both parents present in the home; the mothers' average age was 31.5 years. Procedures were videotaped in a university laboratory setting in which two cameras were placed behind one-way mirrors on adjacent sides of a room. The free play procedure involved a standard set of toys (many of which were recommended by McCune-Nicolich, 1983), distributed

on the floor within easy reach of both mother and child. Mothers were instructed to play naturally with their child; they were told that the researchers were interested in seeing how infants play in an unstructured situation, which toys they preferred, and how they communicated these preferences to others.

The first usable 10 minutes were coded, consistent with the protocol used by Pipp-Siegel et al. (1998). Participants were recruited from families at Gallaudet University as well as the surrounding Washington, DC, area. Informational recruitment fliers were distributed to places such as pediatric clinics, early intervention programs, and schools for the Deaf. A total of 60 participants were divided into four groups according to the same four hearing status categories listed above: Group 1 (D/d) had 16 dyads, group 2 (H/d) had 15 dyads, group 3 (D/h) had 14 dyads, and group 4 (H/h) had 15 dyads.

Measures

Emotional Availability Scales

The Emotional Availability Scales, a standardized measure of EA, consist of four parental scales and two child scales (Biringen, Robinson, & Emde, 1998):

- *Parental Sensitivity* (9-point scale). Ranges from 1 (highly insensitive) to 9 (highly sensitive), with 5 (inconsistently sensitive) and below denoting the non-optimal range. Parental sensitivity includes affect, flexibility, engagement, interaction, and ability to resolve conflict with the child.
- *Structuring* (5-point scale). Ranges from 1 (non-optimal) to 5 (optimal structuring), with 3 (inconsistent structuring) and below denoting the non-optimal range. Structuring includes setting limits for appropriate behavior and providing a supportive frame to maintain the child's interest in the task or to increase the child's understanding.
- *Non-intrusiveness* (5-point scale). Ranges from 1 (intrusive) to 5 (non-intrusive), with 3 (moderately intrusive) and below denoting the non-optimal range. Non-intrusiveness allows autonomy by preventing the child from being over- or under-directed.
- *Non-hostility* (5-point scale). Ranges from 1 (markedly overly hostile) to 5 (non-hostile), with 4 (somewhat non-hostile) and below denoting the non-optimal range. Non-hostility is the lack of impatience, negative affect, and/or critical verbalizations.
- *Child Responsiveness* (7-point scale). Ranges from 1 (non-optimal responsiveness) to 7 (optimal responsiveness), with 4 (inconsistent responsiveness) and below denoting the non-optimal range. Child responsiveness is the child's eagerness and willingness to engage in play with the parent and is seen as the counterpart to parental sensitivity.
- *Child Involvement* (7-point scale). Child involvement ranges from 1 (clearly non-optimal involvement) to 7 (optimal involvement), with 4 (moderate/low involvement) and below denoting the non-optimal range. Child involvement is the child's initiation of interaction with the parent.

Caregiver Touch Coding System

The Caregiver Touch Coding System (Koester & Paradis [Silvia], 2010) measures frequency of touch, but also categorizes each type of touch according to its function. The system was designed to capture the various purposes of touch from mother to child. Each instance of touch initiated by the mother was coded using a frequency count (i.e., tally mark) for each of the following mutually exclusive categories:

1. *Affection:* This touch has a gentle, nurturing quality; it can include playful movements such as stroking, patting, and tickling.
2. *Play-Directed:* Touching the child as part of play, but with no apparent intent to instruct or teach the child about a toy (e.g., using a doll to nuzzle the child).
3. *Attentional:* Tapping on the child's body prior to communicating; typically, this is a tap/sign sequence occurring several times before the infant looks at the caregiver or before signing begins. (For example, while the infant is examining a book, the mother taps the child to elicit visual attention, then signs about the book.)
4. *Instructive:* Guiding the child's use of a toy, modeling appropriate behavior, or prompting the child in relation to toy use (For example, the child tries to use a hammer but holds it upside down, so the mother turns the child's hand to hold the toy correctly.)
5. *Prohibitive:* The caregiver restricts or redirects the child, preventing engagement with a specific toy or behavior, or restrains the child's movement. (For example, the mother holds the child's hand to prevent the child from banging an object on the floor.)
6. *Reposition:* The mother picks up or holds the infant in order to move him or her into a better

position related to toys, the camera, or the mother's vision.

Coding

Because of the more subjective nature of the measure, EA was dual-coded to ensure better reliability. For each dyad, two coders watched the video together and resolved any discrepancies by consensus after determining their score for each subscale. To be considered reliable for touch coding, coders were first trained on a set of "master tapes" that had been coded by the developers of the Caregiver Touch Coding System. A minimum of 80% interrater agreement on all categories of touch was required prior to coding of actual tapes for the present study.

Research Questions

The study by Pipp-Siegel et al. (1998) provided useful information about differences in EA and touch between *hearing* mothers and their D/HH or hearing infants. The present study adds to this body of research by including *Deaf mothers* with hearing or deaf infants. Because of the exploratory nature of this effort, specific directional hypotheses are not listed. However, the following questions, based on previous literature, are of particular interest:

- Does the relationship of EA to the various *functions* of touch vary systematically by group?
- What role does *frequency* of maternal touch play in relation to mothers' EA, and how is this affected by the infant's hearing status?
- Given toddlers' emerging autonomy at this age, touch may be interpreted as intrusive or unnecessary to the hearing child, but may be a crucial aspect of effective communication for a child learning sign language from a Deaf parent. Are these patterns evident in the relationships among EA and touch behaviors in the four groups being investigated?

Results

The results are discussed in three sections, on EA, touch, and the relationship between the two.

Because of the exploratory nature of the present study, all alpha levels of $p < .10$ are reported as significant or marginally significant. (According to Sproull, 2002, and Warner, 2008, this alpha level is deemed acceptable for exploratory research.)

Emotional Availability and Dyadic Hearing Status

Across groups ($N = 60$), the average scores for each Emotional Availability Scale were as follows: Parental Sensitivity: $M = 6.47$ ($SD = 1.69$); Non-hostility: $M = 4.90$ ($SD = 0.35$); Non-intrusiveness: $M = 4.67$ ($SD = 0.73$); Structuring: $M = 6.47$ ($SD = 1.69$); Child Responsiveness: $M = 5.23$ ($SD = 1.51$); Child Involvement: $M = 5.35$ ($SD = 1.47$).

Emotional Availability for All Groups

Multiple univariate analyses of variance were conducted to see if there were differences for parental sensitivity, non-hostility, non-intrusiveness, structuring, child responsiveness, and child involvement depending on mothers' hearing status (see Table 1).

Parental Sensitivity

A univariate 4 (group) × 1 (parental sensitivity) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and parental sensitivity as the dependent variable. The results indicated a marginally significant difference for sensitivity, $F(3, 56) = 2.32$, $p = .09$. Tukey's HSD post hoc test revealed marginally significant differences for sensitivity between the D/d and H/d groups ($p = .07$).

Non-hostility

A univariate 4 (group) × 1 (non-hostility) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and parental sensitivity as the dependent variable. The results indicated no significant difference for non-hostility, $F(3, 56) = 2.05$, $p = .12$.

Non-intrusiveness

A univariate 4 (group) × 1 (non-intrusiveness) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and parental sensitivity as the dependent variable. The results indicated no significant difference for non-intrusiveness, $F(3, 56) = .67$, $p = .57$.

Structuring

A univariate 4 (group) × 1 (structuring) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and parental sensitivity as the dependent variable. The results indicated no significant difference for structuring, $F(3, 56) = 1.10$, $p = .36$.

Child Responsiveness

A univariate 4 (group) × 1 (child responsiveness) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and parental sensitivity as the dependent variable. The results indicated a significant difference for child responsiveness, $F(3, 56) = 3.09$, $p = .03$. Tukey's HSD post hoc test revealed significant differences for child responsiveness between the D/d and H/d groups ($p = .03$).

Table 1
Univariate Analyses of Variance for Emotional Availability (EA): All Four Groups

	Group means (SD)						
EA Scale	*Deaf / deaf*	*Hearing / deaf*	*Deaf / hearing*	*Hearing / hearing*	*Total*	*F*	*p*
Parental Sensitivity	7.00	5.53	6.64	6.67	6.47	2.32	.09
	(1.90)	*(1.46)*	*(1.50)*	*(1.63)*	*(1.69)*		
Non-hostility	5.00	4.73	5.00	4.87	4.90	2.05	.12
	(.00)	*(.59)*	*(.00)*	*(.35)*	*(.35)*		
Non-intrusiveness	4.88	4.53	4.57	4.67	4.67	0.67	.57
	(.34)	*(.64)*	*(.94)*	*(.90)*	*(.73)*		
Structuring	4.25	3.67	4.21	4.13	4.07	1.10	.36
	(1.00)	*(.90)*	*(.89)*	*(1.19)*	*(1.01)*		
Child Responsiveness	5.69	4.27	5.50	5.47	5.23	3.09	.03
	(1.54)	*(1.53)*	*(1.16)*	*(1.46)*	*(1.51)*		
Child Involvement	5.81	4.60	5.57	5.40	5.35	2.04	.12
	(1.38)	*(1.45)*	*(1.16)*	*(1.68)*	*(1.47)*		

Child Involvement

A univariate 4 (group) × 1 (child involvement) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and parental sensitivity as the dependent variable. The results indicated no significant difference for child responsiveness, $F(3, 56) = 2.04$, $p = .12$.

Touch and Dyadic Hearing Status

Multiple univariate analyses of variance were conducted to examine if there were differences for the different types of touch depending on mothers' hearing status (see Table 2).

Affection

A univariate 4 (group) × 1 (affectionate touch) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and affectionate touch as the dependent variable. The results indicated no significant difference for affectionate touch, $F(3, 56) = 1.58$, $p = .21$.

Play-Directed

A univariate 4 (group) × 1 (play-directed touch) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and play-directed touch as the dependent variable. The results indicated no significant difference for play-directed touch, $F(3, 56) = 1.43$, $p = .24$.

Attentional

A univariate 4 (group) × 1 (attentional touch) ANOVA was conducted with group (parent/infant hearing status:

Table 2
Univariate Analyses of Variance for Touch: All Four Groups

	Group means (SD)						
Type of touch	*Deaf / deaf*	*Hearing / deaf*	*Deaf / hearing*	*Hearing / hearing*	*Total*	*F*	*p*
Affection	2.00	2.60	1.07	2.53	2.07	1.58	.21
	(1.83)	*(2.80)*	*(1.27)*	*(2.30)*	*(2.16)*		
Play-directed	4.75	8.20	3.93	7.73	6.17	1.43	.24
	(7.27)	*(6.77)*	*(4.34)*	*(8.19)*	*(6.91)*		
Attentional	14.88	2.93	15.50	0.13	8.35	15.00	.00
	(10.40)	(3.70)	(11.53)	(.52)	(10.41)		
Instructive	3.88	2.53	4.71	1.13	3.05	1.13	.34
	(8.07)	*(5.06)*	*(5.80)*	*(1.25)*	*(5.68)*		
Prohibitive	0.88	1.73	1.07	0.80	1.12	1.00	.40
	(1.20)	(2.15)	(1.21)	(1.82)	(1.65)		
Total, Touch	27.50	20.87	28.50	14.27	22.77	3.01	.04
	(18.69)	(13.78)	(15.11)	(9.51)	(15.45)		

D/d, D/h, H/d, H/h) as the independent variable and attentional touch as the dependent variable. The results indicated a significant difference for attentional touch, $F(3, 56) = 15.00$, $p < .01$. Tukey's HSD post hoc test revealed significant differences for attentional touch between the following groups: D/d and H/d ($p < .01$), D/d and H/h ($p < .01$), D/h and H/d ($p < .01$), and D/h and H/h ($p < .01$).

Instructive

A univariate 4 (group) × 1 (instructive touch) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and instructive touch as the dependent variable. The results indicated no significant difference for instructive touch, $F(3, 56) = 1.13$, $p = .34$.

Prohibitive

A univariate 4 (group) × 1 (prohibitive touch) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and prohibitive touch as the dependent variable. The results indicated no significant difference for prohibitive touch, $F(3, 56) = 1.00$, $p = .40$.

Total Touch

A univariate 4 (group) × 1 (total touch) ANOVA was conducted with group (parent/infant hearing status: D/d, D/h, H/d, H/h) as the independent variable and attentional touch as the dependent variable. The results indicated a significant difference for total touch, $F(3, 56) = 3.01$, $p = .04$. Tukey's HSD post hoc test revealed marginally significant differences for total touch between the D/d and H/h groups ($p = .07$) and the D/h and H/h groups ($p = .06$).

Relationship Between Emotional Availability and Touch

Emotional Availability and Touch Correlations for All Groups

A bivariate correlation was conducted between scores on each EA scale (parent and child) and frequencies of each touch category to examine the relationship between these two constructs among all four groups: D/d, H/d, D/h, H/h (see Table 3).

Significant correlations were found for **parental sensitivity** and the frequency of attentional touch, instructive touch, prohibitive touch, and total touch. Sensitivity was positively correlated with attentional, instructive, and total touch, whereas it was negatively correlated with prohibitive touch.

A significant positive correlation was found for maternal **structuring** and frequency of attentional touch, indicating that as more structuring was used during an interaction, more attentional touch was likewise used.

In addition, significant correlations were found between **child responsiveness** and frequencies of attentional touch, prohibitive touch, and total touch. Again, we see a negative correlation between an aspect of EA and prohibitive touch. The other types of touch (attentional and total) were positively correlated with child responsiveness.

Finally, significant correlations were found between **child involvement** and frequencies of affectionate, attentional, prohibitive, and total touch.

Correlations for Deaf/deaf Dyads

For the group in which both partners were deaf, significant correlations were found for **parental sensitivity** and the use of both attentional touch and prohibitive touch (see Table 4).

Significant correlations were found between **structuring** and attentional touch and total touch. **Child responsiveness** was also significantly correlated with attentional touch and prohibitive touch for this group. In addition, **child involvement** and two functions of touch (attentional and prohibitive) were significantly correlated for D/d dyads. In each case in which prohibitive touch shows a significant relationship with some aspect of EA, it is important to remember that the correlation was negative for this group. In other words, it was the only type of touch that was not positively associated with EA during the parent-infant interaction.

Table 3
Correlation Matrix for Emotional Availability and Functions of Touch (Four Groups Combined)

Variable	*Affection*	*Play-directed*	*Attentional*	*Instructive*	*Prohibitive*	*Reposition*	*Total*
Parental sensitivity	.15	.05	.26*	.22†	–.22†	–.10	.26*
Non-hostility	.21	–.07	.18	.06	–.07	–.06	.12
Non-intrusiveness	.18	–.05	–.03	.13	–.14	–.14	–.02
Structuring	.12	.04	.24†	.08	–.15	–.10	.20
Child Responsiveness	.14	.00	.29*	.17	–.26*	–.08	.23†
Child involvement	.24†	–.03.	.26*	.21	–.24†	–.0 7	.23†

†$p < .10$ (2-tailed). *$p < .05$ (2-tailed).

Table 4
Correlation Matrix for Emotional Availability and Functions of Touch (Deaf/deaf Dyads)

Variable	*Affection*	*Play-directed*	*Attentional*	*Instructive*	*Prohibitive*	*Reposition*	*Total*
Parental sensitivity	.00	.24	.45†	.22	–.57†	–.19	.39
Non-hostility	—	—	—	—	—	—	—
Non-intrusiveness	–.22	.09	–.05	.06	–.02	–.35	–.02
Structuring	–.08	.21	.60*	.25	–.33	–.03	.49†
Child Responsiveness	–.20	.25	.52*	.22	–.62*	–.15	.41
Child involvement	–.03	.26	.49†	.22	–.56*	–.07	.42

†$p < .10$ (2-tailed). *$p < .05$ (2-tailed).

Correlations for Hearing/deaf Dyads

For the group in which mothers were hearing and infants were deaf, the only significant correlation was between **child involvement** and affectionate touch (see Table 5).

Correlations for Deaf/hearing Dyads (Table 6)

For the group in which mothers were Deaf and infants were hearing, the only significant correlation was between **parental sensitivity** and play-directed touch (see Table 6).

Correlations for Hearing/hearing Dyads

For the group in which both partners were hearing, significant correlations were found between **parental sensitivity** and affectionate touch, **child responsiveness** and affectionate touch, **child involvement** and affectionate touch, and **non-intrusiveness** and repositioning touch. **Child responsiveness** and **involvement** were both positively related to affectionate touch. However, non-intrusiveness and the use of touch to reposition the child were negatively related. This means that when the mother was *less* intrusive, her tendency to frequently reposition the infant *decreased* (see Table 7).

Discussion

The purpose of the present study was to investigate the relationship between maternal EA and the use of touch by hearing and Deaf mothers with their deaf or hearing infant. This was an effort to add to the literature on deafness and to describe specific interactional differences between Deaf and hearing mothers with their infants.

Table 5
Correlation Matrix for Emotional Availability and Functions of Touch (Hearing/deaf Dyads)

Variable	*Affection*	*Play-directed*	*Attentional*	*Instructive*	*Prohibitive*	*Reposition*	*Total*
Sensitivity	.27	.09	.23	.07	–.13	–.09	.13
Non-hostility	.36	.05	.02	.03	–.12	–.16	.05
Non-intrusiveness	.17	.01	.38	.11	–.41	–.14	.06
Structuring	.11	–.06	.04	–.19	–.09	.12	–.06
Child Responsiveness	.33	.17	.26	–.07	–.13	.15	.20
Child involvement	.47*	.18	.23	.05	–.24	.14	.24

*$p < .05$ (2-tailed).

Table 6
Correlation Matrix for Emotional Availability and Functions of Touch (Deaf/hearing Dyads)

Variable	*Affection*	*Play-directed*	*Attentional*	*Instructive*	*Prohibitive*	*Reposition*	*Total*
Parental sensitivity	.29	.44†	–.01	.41	.04	.19	.35
Non-hostility	—	—	—	—	—	—	—
Non-intrusiveness	.43	.29	–.35	.38	–.07	.24	.05
Structuring	.16	.27	.00	–.01	–.20	–.18	.03
Child Responsiveness	.23	.41	.02	.38	–.10	.15	.33
Child involvement	.18	.10	–.05	.37	–.15	.12	.25

†$p < .10$ (2-tailed).

Table 7
Correlation Matrix for Emotional Availability and Functions of Touch (Hearing/hearing Dyads)

Variable	*Affection*	*Play-directed*	*Attentional*	*Instructive*	*Prohibitive*	*Reposition*	*Total*
Parental sensitivity	.38†	–.15	–.11	.30	–.02	–.21	–.06
Non-hostility	.36	–.04	.11	.04	.18	.29	.18
Non-intrusiveness	.27	–.28	.10	–.28	.04	–.58†	–.3 4
Structuring	.42	.05	–.03	.18	.05	–.14	.15
Child Responsiveness	.48†	–.30	–.09	.16	–.04	–.37	–.24
Child involvement	.48†	–.35	–.07	.31	.03	–.30	–.24

†$p < .10$ (2-tailed).

The investigation was modeled after the work of Pipp-Siegel et al. (1998), and followed their suggestion that the *quality* of touch be examined in addition to the quantity. The present study was not a direct replication, but, rather, a variation that incorporated Deaf mothers, making for a complete analysis of all possible combinations of parent-child hearing status. The results substantiate the importance of looking at touch in more detail than has been done in the past, particularly with this population of parents and infants. Previous studies, if they included an examination of touch at all, often did not address its communicative function or its relationship to emotional development.

Emotional Availability and Hearing Status

There was a significant difference among the four groups in the present study in regard to the EA scale Child Responsiveness. The pattern that emerged was that scores for the Hearing mother/deaf infant (H/d) group were the lowest in comparison to those of each of the other groups. Given what the previous literature has shown, this is perhaps not surprising; historically, this group has been the one that presents with the most difficulties, particularly at the early stages of infancy, and is therefore often the target of intervention when deafness is involved.

Hearing mothers of deaf infants were found to have lower sensitivity scores than hearing mothers with hearing infants. This may be an indication that hearing mothers continue to have difficulties engaging and creating bids for interaction with their deaf 18-month-old children. In other words, regardless of communication mode, it may be more difficult for H/d mothers to maintain attention and to interpret their toddler's emotional cues, with lower EA sensitivity scores being the result. As the child's own language and communication skills improve, however, it should be expected that this interactive pattern will also change.

It is important to note that the similarity of the two groups of Deaf mothers is unsurprising, as there was little reason to expect that Deaf mothers would treat a deaf infant any differently than a hearing infant. That is, both of these children will most likely be learning sign language from their Deaf parents, who will therefore incorporate similar communicative strategies into their interactions.

Functions of Touch and Hearing Status

There were significant differences among the groups for use of both attentional touch and total touch during an episode of free play. As emphasized previously, the use of tactile contact for purposes of eliciting a child's attention is especially important when the child is deaf. This was found in the current results, as Deaf mothers used attentional touch significantly more than hearing mothers. The amount of touch used for attention is part of the cumulative amount found in total touch, which is also significantly greater for Deaf mothers than for hearing mothers of hearing infants. Therefore, the ease and frequency with which Deaf parents incorporate attentional touch into their interactions is a very important finding, and one with implications for those who work with families of young deaf children, regardless of the chosen mode of communication.

The findings of the present study are particularly interesting in that the H/d group was *not* found to use the least amount of attentional or total touch. Although hearing mothers of deaf infants may not yet have adapted to using attentional touch as intuitively as Deaf parents, these results seem to indicate that hearing mothers of deaf infants *are* in fact starting to use touch more frequently during interactions when their babies are 18 months old.

In contrast, there were significant differences between hearing mothers of deaf infants and hearing mothers of hearing infants in their use of touch for attentional purposes. This is an interesting finding in that, again, it appears that hearing mothers of deaf infants are learning to adjust their communication strategies in a benefi-

cial way to meet the needs of their child. Their ease or intuitive use of touch, according to these results, may not be quite as fluid or frequent as that of Deaf mothers; however, it is evident that they are trying, and are more aware of the necessity of using touch for communication and interaction as compared to hearing mothers of hearing infants. This is a hopeful finding in that it indicates a level of adaptation that may still be emerging, but that is nevertheless highly appropriate in interactions with a deaf child. In other words, hearing mothers with deaf infants do seem to be learning to use various modalities in their interactions that may be compensating quite effectively for their 18-month-old child's hearing loss.

The Relationship Between Emotional Availability and Touch

Parental sensitivity as measured by EA was correlated with attentional, instructive, prohibitive, and total touch. This finding adds support to the importance of the tactile modality in interactions with a young child, especially one who is deaf. Part of sensitive parenting with an 18-month-old is engaging the child in interactions that provide teachable, as well as fun and positive, moments. This would then be seen in the use of instructive touch. The negative correlation between sensitivity and prohibitive touch is particularly understandable given the age of the children observed in the present study. As toddlers increasingly assert their independence and test the limits of the social and physical environment, occasional restrictions may be needed from caregivers. However, more sensitive parenting showed less reliance on prohibitive touch, with other methods of boundary setting perhaps being used instead. Finally, the positive correlation with total touch seems to imply that, in contrast to what has previously been found (see, e.g., Pipp-Siegel et al., 1998), touch is not intrusive or insensitive in these dyads, but, rather, a characteristic of sensitive mothers.

In the present study, the EA measure of structuring was positively correlated with mothers' use of attentional touch. Optimal structuring would provide the framework for keeping the child's attention during the interaction, helping and redirecting the child when necessary. Thus, it would be expected that the use of attentional touch would coincide with optimal scaffolding in the interaction, particularly in the case of deaf infants, as was verified by these findings.

Child responsiveness was also positively correlated with attentional touch; thus, a child who is well engaged during the interaction would most likely be responding to bids and prompts from his or her mother via attentional touch, regardless of hearing status. The correlation between child responsiveness and total touch indicates that children who are willing to engage with and respond appropriately to their parents are likely to have parents who use touch as an effective means of communication, regardless of the specific function of that tactile contact.

Parents who frequently use touch to express affection for their child are likely to have children who respond to that kind of warmth, as seen in the positive correlation between child involvement and affectionate touch. Child involvement was also positively correlated with the mothers' overall use of touch. Because touch is used as a mode of communication and often conveys positive affect, using more touch appears to foster engagement from the child at this age, regardless of hearing status.

Conclusions

The results of the present study highlight and expand upon previous research in terms of how Deaf mothers and hearing mothers interact with their 18-month-old infants. Deaf mothers of deaf infants are raising and communicating with their children in ways these mothers already understand, including the use of additional sensory accommodations as needed. The intuitive parenting behaviors Deaf mothers display (such as using touch to enhance communication) are automatic and natural for them. Deaf parents with hearing children are likely to be raising their children to be bilingual, and therefore also have little need to adjust their parenting strategies.

Hearing parents with deaf children represent the most interesting and unique dyadic combinations among the four groups in the present study. These parents have an added challenge and must learn new ways of interacting and communicating with their child that may not come naturally to them (e.g., using attentional touch). Although these parents are certainly using touch as a mode of communication, they are doing so in ways that are somewhat different from those used by mothers in the H/h dyads. It may not yet feel natural for H/d mothers to use as much touch as Deaf parents use, but they are showing an awareness of its benefits; this may be due to a process of reinforcement as their tactile contact succeeds in gaining the deaf child's response. Early intervention can play an important role in shaping and scaffolding the *parents'* behavior, thus helping to develop the most supportive context for a deaf child and his or her family during the early years (Traci & Koester, 2010). Interventionists can help parents see that touch creates more opportunities for joint attention, which makes inter-

actions more successful and satisfying and leads to better social, emotional, linguistic, and overall developmental outcomes.

It has been well established that the communication style between hearing parents and their deaf infants often differs from that of Deaf parents and deaf infants; it is important to look toward the latter as models for successful communication so as to incorporate some of their subtle behaviors into intervention efforts. With effective intervention, hearing parents can develop the important verbal and nonverbal child-directed strategies that support the language acquisition and social-emotional growth of a deaf child, regardless of whether the emphasis is on signed or oral communication. Rather than rely solely on vocalizations, for example, hearing parents can learn communication strategies that involve "physical contact, gestures, eye contact, and facial expressions similar to those seen in deaf dyads" (Vaccari & Marschark, 1997, p. 795).

In regard to intervention, some general strategies that convey the importance of touch to hearing mothers of deaf infants might also be helpful. Again, it is important to note that according to the present investigation, hearing mothers of deaf infants are already making adaptations in their interactions, incorporating touch more than hearing mothers of hearing infants, yet not quite to the same extent as Deaf mothers.

Limitations of the Study and Future Directions

As noted, the present study used a videotaped dataset from the Gallaudet Infancy Study, which was a comprehensive and groundbreaking longitudinal investigation of Deaf and hearing mothers with their deaf or hearing infants. In this sample, the Deaf mothers and children predominantly relied on signing. At the time of the original Gallaudet Infancy Study, cochlear implants were not as commonplace as they are today. Although none of the D/HH infants were using cochlear implants at the time of the present study, some did receive these at later ages. Follow-up research with a sample of children post-implant would provide important insights regarding parent-child interactions, parental sensitivity, and early communication with this group of D/HH children.

Additionally, further research should investigate the main constructs in the present study—EA and the functions of touch—with children who are in early childhood (ideally, ages 3–5 years). During this period, language should be better developed and therefore more revealing of the parent-child relationship. Moreover, including a compliance task (e.g., cleaning up) or a cooperative task (e.g., pursuing a goal) would provide the opportunity to evaluate EA in terms of how both mother and child handle conflict, boundaries, and negotiation. However, it is likely that with older children, the functions of touch may decrease or drop out altogether. Nevertheless, seeing how dyads with older deaf children change or adapt these tactile strategies used for communication would also be very informative. Perhaps touch would be used in a way not captured in the Caregiver Touch Coding System and/or not used with infants and toddlers, or perhaps new functions of touch that are more closely related to cognitive scaffolding would have to be added.

Another direction for future research would be to examine the use of language during these dyadic interactions. The dyadic parent-child interaction coding system (DPICS) is a well-established, validated, and reliable microanalytic coding system designed to assess the quality of parent-child interactions through categorization of verbalizations (e.g., praise, description, question) between the dyadic partners (Eyberg & Robinson, 1983). Ideally, coders proficient in sign language should be used to record interactions with Deaf mothers so as to code the verbalizations as accurately as a hearing coder is able to code mothers' vocalizations. This kind of study would provide information about the *quality* of language and *types* of things being said, and whether or not there is a difference between Deaf and hearing mothers in this regard. Touch served as a complement to the interaction between mothers and infants conveyed by EA in the present study; however, it is only one way of looking at these dyads. The DPICS would be beneficial in that it would provide another perspective on and further insights into the complexities of dyadic interactions. The inclusion of different types of measures can facilitate the understanding of early mother-infant interactions and the many aspects of communication that play a role in the developing relationship.

Lastly, we recommend a replication of the present study using father-child dyads to see how EA and touch may (or may not) vary for them as compared to mother-child dyads. There has not been an extensive amount of research done in this area. Loots and Devisé (2003) compared mothers and fathers who were both deaf and hearing, but all of the children in their study had limited hearing. Again, being able to compare all combinations of the deaf and/or hearing dyads and their communication styles would provide a better understanding of potentially important interactional differences.

A Note on Terminology

1. In the present article, the word *Deaf* is used when reference is being made to individuals who are members of the Deaf community. The word *deaf* is used to refer to partial or complete hearing loss, in general. The phrase *deaf/hard of hearing* (second reference, *D/HH*) is used as an encompassing term to include the spectrum of individuals with hearing loss.

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