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To the Graduate Council:

I am submitting herewith a dissertation written by Lauren Renee Bader entitled "Parents' Perceptions and Responses to Infant Emotions." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Child and Family Studies.

Hillary Fouts, Major Professor

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(Original signatures are on file with official student records.)

Parents' Perceptions and Responses to Infant Emotions

A Dissertation Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Lauren Renee Bader
May 2017

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Abstract

Parents respond to their infants' emotions in ways they believe are most appropriate. These reciprocal interactions make up the infants' social-emotional environment and appear to guide future development and relationship formation; this trajectory is supported mostly from research in Western industrialized contexts. This dissertation consists of three studies and addresses the following over-arching research questions: How have parents' perceptions of infant emotions been studied? How do Gamo mothers in rural Southern Ethiopia perceive their infants' emotions and what do they believe are appropriate responses to emotions? Do Gamo mothers vary in their feelings about their infants' negative emotions and is this linked to differences in mother-infant interactions? Parents' perceptions of infants' emotions were investigated through a systematic literature review and qualitative study that included interviews with 29 Gamo mothers about perceptions of their infants' emotions and what they believed were the best responses. The last study examined the link between 23 Gamo mothers' feelings about their infants' negative emotions and mother-infant interactions measured through focal-infant observations. In the systematic literature review, 28 articles were identified and demonstrated that parents' perceptions of their infants' emotions have been studied in the biological and social sciences and mostly among European American mothers. In interviews with Gamo mothers, perceptions of infant emotions were associated with beliefs about basic needs for infants and some mothers expressed stress when their infants fussed or cried. Mothers who reported stress showed fewer mother-infant interactions. However, mothers who did not express stress had infants that fussed and cried more than infants of mothers who reported stress. The results from the systematic literature review suggest that a trans-disciplinary approach is needed in the study of parents' perceptions of infant emotions in order to understand how parents perceive their infants' emotions. The link between Gamo mothers' perceptions of their infants' emotions and basic needs suggests that mothers were mainly focused on keeping infants healthy and alive in a relatively harsh environment. Lastly, infants with nonstressed mothers may cry and fuss more because they are involved in more interactions with their mothers overall and perhaps use fussing and crying to maintain interactions.

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Chapter I

Introduction

Infants signal need for their caregivers through their emotional displays (Bell & Ainsworth, 1972; Bowlby, 1988; van Ijzendoorn & Hubbard, 2000). How mothers perceive these emotions and respond is associated with infant social and emotional development (Izard, 1994; Keller, 2008; Sroufe & Waters, 1976). Infant emotions develop over time and mothers' facial emotion reponses help to regulate infants' emotions and contribute to the socialization of infants' emotions (Izard, 1994; Malatesta & Haviland, 1982). Infants begin to differentiate positive and negative emotions around 3 months of age (Izard, 1994) and how mothers' perceive and respond to these emotions is linked to the social and emotional development of infants.

In particularly harsh environments (e.g., high infant mortality risk), mothers may respond to infants' emotional displays with basic needs like breastfeeding and perceive their infants' emotions as signals for physical needs. Furthermore, mothers living in these harsh environments may feel more stress (Belsky, Steinberg, & Draper, 1991; Dayton, Huth-Bocks, & Busuito, 2016) and infants' distress signals may further exacerbate this stress because of the implications of what infant fussing and crying mean in that particular context.

The majority of behavioral science research has been conducted among Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies (Henrich, Heine, & Norenzayan, 2010) and this includes studies related to social-emotional development and perceptions of infant emotions (for overview see Otto & Keller, 2014 and Quinn & Mageo, 2013). Furthermore, very few studies related to infant emotions have been conducted in non-Western small-scale cultures. Thus, this dissertation fills gaps in the literature on parenting and child development among non-Western small-scale cultures with two manuscripts that focus on

infant social-emotional development and parenting among Gamo agriculturalists living in a rural village in Southern Ethiopia.

The following three chapters of this dissertation (Chapters 2, 3, and 4) are written as manuscripts and formatted to submit for publication. The first manuscript (Chapter 2) is a systematic review of research on parents' perceptions of their infants' emotions. The second manuscript (Chapter 3) is a qualitative study investigating Gamo mothers' perceptions of their infants' emotions. The third manuscript (Chapter 4) utilizes a mixed-methods approach to examine the link between mothers' feelings towards their infants' negative emotions and interactions between mothers and infants. The last chapter (Chapter 5) provides a conclusion to the dissertation in its entirety.

The first manuscript of this dissertation synthesizes literature on parents' perceptions of infants' emotions in a systematic literature review. Parenting and infant care is complex and thus, parents' perceptions of their infants' emotions have been covered in many different disciplines like anthropology, psychology and neuroscience. The aim of this second chapter is to bring this literature together to discuss the many lenses through which perceptions of infants' emotions have been studied and the methodologies and instruments used to measure parents' perceptions of their infants' emotions. Patterns in findings from 28 articles spanning different fields are discussed. I identified 5 different themes from the included articles. Furthermore, I found that certain populations are overrepresented in the literature on parents' perceptions of infants' emotions. I discuss the implications of gaps in the literature and call for a trans-disciplinary approach to the study of parents' perceptions of their infants' emotions.

In the third chapter of the dissertation, I present a qualitative study with 29 Gamo mothers living in a small village of the Gamo-Dorze highlands of Southern Ethiopia. This study

was guided by my interest in how cultural values and the environment are linked to mothers' perceptions about their infants' emotions. Mothers were interviewed about typical Gamo infant care practices and child development within the village. Gamo mothers were also asked about what emotions their infants displayed and what mothers felt in response to these emotions as well as what mothers believed their infants needed in response to these emotions. I identified patterns in mothers' perceptions and responses to their infants' emotions through constant comparative analysis and thematic coding in NVivo. Patterns in mothers' responses to the interviews indicated that infants' emotions were linked to infants' basic needs like breastfeeding, complementary food, and holding and comprised the Gamo cultural model of infant emotions and needs. Within this model, mothers discussed the conflict between their work demands and infant care. Gamo mothers were required to spend many hours per day working in their fields since the Gamo subsist mostly on agricultural products and women are responsible for much of the planting, harvesting, and preparing of the food. Many mothers relied on sibling caretakers to help with infant care and mothers discussed the necessity of their older children to help respond to their infants' emotional displays. Furthermore, many mothers discussed the stress they felt when their infants appeared distressed; however some mothers did not express that they felt any stress. The implications of stressed and nonstressed mothers are discussed in Chapter 4.

In Chapter 4, I examined how mothers' feelings about their infants' negative emotions were linked to mother-infant interactions. In interviews with Gamo mothers, I found that a subset of mothers expressed that they felt stress in response to their infants' negative emotions. Mothers were grouped into stressed and nonstressed groups in order to investigate whether stressed and nonstressed mothers varied in interactions with their infants. Focal-infant observations were used to understand the daily lives of infants as well as obtain the frequency of

various mother-infant interactions. Multiple linear regressions were used to investigate the link between maternal expression of stress or lack thereof in response to their infants' emotions and mother-infant interactions. Furthermore, I also looked at the link between other factors like infant age, gender, birth order, and mothers' work level and mother-infant interactions. Maternal expressions of stress in response to their infants' emotions and infant age, gender, birth order, and mothers' work level are all a part of the ecocultural context in which Gamo infants develop. These factors may be linked to variations in Gamo mother-infant interactions.

In sum, this dissertation provides information about the current literature on parents' perceptions of their infants' emotions as well as a perspective of parenting and infant development in a lesser-studied cultural context. Furthermore, the study of mothers' perceptions of their infants' emotions in this context addresses gaps in the extant literature on perceptions of infants' emotions, which has mostly focused on parents and infants in Western societies.

References

Bell, S. M., & Ainsworth, M. D. S. (1972). Infant crying and maternal responsiveness. *Child Development, 43*(4), 1171-1190.

Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: and evolutionary theory of socialization. *Child Development, 62*(4), 647-670.

Bowlby, J. (1988). *A secure base*. Abingdon, Oxon, UK: Routeldge.

Dayton, C. J., Huth-Bocks, A. C., & Busuito, A. (2016). The influence of interpersonal aggression on maternal perceptions of infant emotions: Associations with early parenting quality. *Emotion, 16*(4), 436-448.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2-3), 61-83.

Izard, C. E. (1994). Innate and universal facial expressions: evidence from developmental and cross-cultural research. *Psychological Bulletin, 115*(2), 288-299.

Keller, H. (2008). Culture and biology: The foundation of pathways of development. *Social and Personality Psychology Compass, 2*(2), 668-681.

Malatesta, C. Z., & Haviland, J. M. (1982). Learning display rules - The socialization of emotion expression in infancy. *Child Development, 53*(4), 991-1003.

Otto, H., & Keller, H. (Eds.). (2014). *Different face of attachment - Cultural variations on a universal human need*. Cambridge: Cambridge University Press.

Quinn, N., & Mageo, J. M. (2013). *Attachment reconsidered: Cultural perspectives on a Western theory*. New York: Palgrave Macmillan.

Sroufe, A. L., & Waters, E. (1976). The ontogenesis of smiling and laughter: a perspective on the organization of development in infancy. *Psychological Review, 83*(3), 173.

van Ijzendoorn, M. H., & Hubbard, F. O. (2000). Are infant crying and maternal responsiveness during the first year related to infant-mother attachment at 15 months? *Attachment & Human Development, 2*(3), 371-391.

Chapter II

Parents' Perceptions about Infant Emotions: A Cross-Disciplinary Systematic Literature Review

Abstract

Parents' perceptions of their infants' emotions are linked to how they respond to their infants and parents' perceptions can vary based on a number of factors. This suggests that this particular aspect of parenting is complex. A preliminary investigation suggested that parents' perceptions of their infants' emotions have been studied across many disciplines. A systematic literature review was performed to compile the literature on parents' perceptions of their infants' emotions. 28 articles spanning many different disciplines were identified supporting the idea that parents' perceptions about their infants' emotions are multifaceted. Data extraction from each article included the theoretical approach used to study parents' perceptions or lens through which parents' perceptions of their infants' emotions were understood. Furthermore, the methodologies and instruments used to investigate parents' perceptions and the main findings were identified. Five main patterns emerged from the findings in the identified literature and included socio-cultural factors that influence parents' perceptions of their infants' emotions, the effects of parental experience, parental factors contributing to variation in perceptions, the link between parent-infant attachment and perceptions, and the neurophysiological correlates of parents' perceptions of their infants' emotions. This review suggests that a trans-disciplinary approach to the study of perceptions' of infants' emotions is warranted to better understand the complexity surrounding how parents' perceive their infants' emotions and how these perceptions lead to variations in responses to infants' emotional displays.

Introduction

Parents' perceptions of their infants' emotions influence how they respond to their infants as well as infant social and emotional development. Furthermore, parental responsiveness guides infants in their expectations about the emotional and social aspects of their environment (Halberstadt & Lozada, 2011). Perception of emotion has been studied through the lenses of attachment theory (DeOliveira, 2001; Leerkes & Siepak, 2006) and by investigating the roles of cultural beliefs and values in perception of emotion (Suizzo, 2004). Researchers have also looked at responses to infant emotion in the brain and through physiological processes related to responses to emotion (Barrett et al., 2012; Leyh, Heinisch, Behringer, Reiner, & Spangler, 2016). Furthermore, the roles of parental experience and psychosocial stress in perceptions of infant emotions have also been investigated (Dayton et al., 2016; Green, Jones, & Gustafson, 1987). Because parents' perceptions of their infants' emotions are linked to social and emotional development, researchers in many fields utilizing different methodologies and theoretical lenses have investigated how parents' perceive these emotions, the factors that cause these perceptions to vary, and how perceptions influence responses. This literature needs to be synthesized in order to provide a clearer picture of how and why parents respond to their infants and what contributes to variation in these responses based on their perceptions of their infants' emotions.

Currently, the literature consists of mostly cross-sectional studies and this includes very few qualitative studies and ethnographies. Furthermore, very few studies investigate perceptions of infants' emotions through a cultural lens, which incorporates cultural values and practices into the understanding of perceptions. Fathers are also never the sole focus of studies on parents' perceptions of infants' emotions and when included, the number is usually disproportionately lower than the number of mothers (Messinger, Cassel, Acosta, Ambadar, & Cohn, 2008;

Zeifman, 2003). Furthermore, there is some disagreement about whether parents are better than nonparents at accurately perceiving infants' emotions (Kamel & Dockrell, 2000; Lindová, Špinka, & Nováková, 2015). Most studies also investigate perceptions from one lens (i.e., beliefs about infant crying); however, a few studies have investigated the links between parents' perceptions and neurophysiological responses (Barrett et al., 2012; Krippl, Ast-Scheitenberger, Bovenschen, & Spangler, 2010).

This study provides a systematic literature review on parents' perceptions of infants' emotions. By considering research from multiple disciplines in the social and biological sciences and various theoretical perspectives, we highlight the cultural, psychological, environmental, and neurobiological processes involved in parents' perceptions of their infants' emotions. Bringing together research from multiple fields and perspectives is important in order to provide a foundation for future trans-disciplinary research with the potential to provide holistic understandings of parents' perceptions and responses to infant emotions.

Background

Attachment theory is the dominant perspective through which perceptions of infant emotions have been studied because of its focus on the mother-infant relationship. Furthermore, studies on attachment have identified possible correlates (e.g., infant temperament, adult attachment relationships, parental stress) between aspects of the mother-infant attachment relationship and maternal responsiveness to infants and to maternal perceptions (Leerkes & Crockenberg, 2006; Leerkes & Siepak, 2006). Even though attachment theory in particular has been the dominant lens through which researchers have examined perceptions of infant emotion, questions regarding the generalizability of certain tenets of attachment theory have been questioned. The universal (i.e., Western-centric) claim of normative mother-infant attachment

behavior (i.e., the nature of sensitivity and security to promote individuality and autonomy), in particular, needs to be expanded to include secure mother-infant relationships that look different from what is typically discussed (for overview see Otto & Keller, 2014 & Quinn & Mageo, 2013). A growing number of researchers have suggested that this can be achieved through the development of culturally informed interpretations of beliefs and responses to infant emotion (Keller, 2013; Otto & Keller, 2014; Rothbaum & Morelli, 2005).

Some assumptions of attachment theory appear to hold true cross-culturally, like infants requiring a secure base (Posada et al., 2013) and others need to be adapted to different cultural contexts (Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985; Keller, 2013; Miyake, Chen, & Campos, 1985; Rothbaum & Morelli, 2005). For example, some attachment researchers have claimed that research on responsivity to infants' emotions, the basis of attachment theory, may stem predominantly from research among Western cultures (Friedlmeier & Trommsdorff, 1999; Keller, Kärtner, Borke, Yovsi, & Kleis, 2005; Rothbaum & Morelli, 2005) because studies from non-Western cultures have identified an anticipatory response from mothers to changes in their infants' emotional states (Harwood, 1992; Keller, Kärtner, et al., 2005). These mothers respond to subtle signals from their infants rather than waiting to respond to overt emotion (Friedlmeier & Trommsdorff, 1999; Harwood, 1992; Keller, et al., 2005) suggesting that the attachment umbrella could be expanded beyond responsiveness. Furthermore, van Ijzendoorn & Kroonenberg (1988) found more variation in classifications of infants' attachment relationships to their mothers within countries than between countries suggesting the need for expansions to the procedures used to measure attachment.

Relatively recently, social scientists have begun to investigate emotion (i.e., interpretation and socialization) through a cultural lens (Lutz & White, 1986) and within cultural systems

(Halberstadt & Lozada, 2011). For example, Halberstadt and Lozado (2011) argued that emotion socialization (i.e., the encouragement or discouragement of emotion expression) might be influenced by the value of children (e.g., contributors to the productivity of the family enterprise, gifts from the gods, or as the presence of gods) in societies. In societies where children are expected to participate in work, parents may discourage children's emotion expression as it could inhibit productivity (Halberstadt & Lozada, 2011). Furthermore, cultural values such as collectivism and individualism may influence parents' beliefs about when particular emotions should emerge in children (Keller & Otto, 2009) and the appropriateness of displays of certain emotions in adulthood (Eid & Diener, 2001).

Research on emotional socialization has shown that variation in responses to children stem from cultural beliefs about the appropriateness of attending to children (Lutz & White, 1986), meaning that cultural beliefs about infant emotions guide parents to respond to their infant when and how they feel is best. Specifically, parental ethnotheories, which are cultural beliefs about appropriate caregiver practices and child development (Super & Harkness, 1986), have been identified for infants' emotions. Several studies have identified cultural beliefs about infant emotion and have demonstrated variation in the meaning of infant emotion between cultures (Fouts, Hewlett, & Lamb, 2012; Harkness & Super, 1983; Keller & Otto, 2009). Responses and beliefs about infant emotion vary cross-culturally; for example, the Kipsigis (Kenya) believe in prompt responsiveness to infants' emotional states, particularly by individuals other than the mother (Harkness & Super, 1983) whereas the Aka and Bofi forager parents (Central Africa) are reluctant to leave infants with sibling caretakers for fear that infants will be left to cry (Fouts, Hewlett, et al., 2012). Nso parents of Cameroon believe that "good" infants are those that are calm and express no emotion, especially negative emotion (Keller & Otto, 2009). These

examples demonstrate how beliefs about infants' emotions and responsiveness can be viewed through a cultural lens. Furthermore, these examples suggest that parents' beliefs about emotion are influenced by cultural models of parenting and cultural schema (i.e., constructed frameworks of thinking shared by a society). Lutz and White (1986) suggested that beliefs about emotion are influenced by cultural values and research should consider the intersections between beliefs about emotion and cultural schema.

Parents' perceptions and responses to infants' emotions have also been investigated at the neurophysiological level (Barrett et al., 2012; Leyh et al., 2016; Spangler, Maier, Geserick, & von Wahlert, 2010). Researchers have identified specific brain regions associated with responses to infant emotion (Barrett et al., 2012) as well as the effects of adult attachment security on physiological responses to infant crying (Leerkes, Su, Calkins, Supple, & O'Brien, 2016). Neurophysiological studies on perceptions of infants' emotions suggest that these perceptions and beliefs manifest themselves at the cellular level and can be influenced by parents' early life experiences (Barrett et al., 2012; Leerkes, Parade, & Burney, 2010).

Next, this systematic review will highlight the various disciplines, perspectives, and methodologies that have guided studies about perceptions and responses to infant emotions. Furthermore, this study will address multiple factors (e.g., cultural values, parental experience, psychosocial risk factors, attachment security, early life experiences, etc.) that predict how parents perceive their infants' emotions and subsequently respond. The research on perceptions of infants' emotions has transected disciplinary boundaries because parenting and infant care is multifaceted. This study reviews literature on perceptions of infants' emotions across disciplines to highlight this complexity. Due to its complexity, studies on parenting and infant care, including perceptions of infants' emotions, could benefit from trans-disciplinary research. Thus,

trans-disciplinary approaches are needed and synthesizing research on perceptions of infant emotions across disciplines is an important step for guiding future research.

Methods

This systematic literature review followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA), which is a framework used by many researchers to write systematic literature reviews and provide an evidence-based minimum set of items that should be included in a review (Moher, Liberati, Tetzlaff, & Altman, 2009; Smith, Devane, Begley, & Clarke, 2011). Items in this systematic literature review were adapted from the PRISMA checklist and included: title, abstract, introduction including objectives, methods, including the information sources/databases, my electronic search strategy, results, and discussion.

Search Strategy

For this review, we conducted electronic database searches of EBSCO, PsychINFO, Web of Science, and AnthroSource. Years available from EBSCO include sources from 1680-present, for PsychINFO 1800-present, for Web of Science 1900-present, and for AnthroSource 1888-present. One article was included after inspecting references for additional sources of literature on parents' perceptions of infant emotions. There were no date restrictions for including articles in this study. The earliest publication included was from 1987 and the latest from 2016. Four articles were from the 1980s, 3 from the 1990s, 12 from 2000-2010, and 9 from 2011-2016. Our search terms paired the words *parent cognition* OR *parent perception* OR *parental ethnotheory* OR *parent belief* with *infant emotion* OR *infant emotion socialization*.

Study Inclusion and Exclusion Criteria

Reviewed articles included both longitudinal and cross-sectional data and were required to be empirical (i.e., presenting qualitative or quantitative data). The review consisted of book

chapters, journal articles and one doctoral dissertation. No meta-analyses were included because they did not emerge in database searches using the above keywords and phrases. Articles needed to include a measure of parents' perceptions of infant (birth to 24 months) emotion with a clear theoretical foundation. Furthermore, articles were excluded if participants included preterm infants or infants with developmental delays because research has shown that preterm infants and infants born with disabilities that impact development (e.g., Down's syndrome) display abnormal cry acoustics (for review see Soltis, 2004) which may affect parent perceptions of emotions. The articles included in this review were limited based on the inclusion and exclusion criteria and do not cover all aspects of infants' emotions, their development, or parents' perceptions.

Data Extraction and Synthesis

Data collection took place between September 2016 and October 2016. Data collected from each study included the research objectives, methodologies used and relevant findings regarding: 1) how parents perceive infants' emotions, 2) factors that contributed to variation in perceptions, and 3) the effects of parents' perceptions of infant emotions on parental responsiveness if responses were a part of the research study. Results of this systematic literature review were organized into common themes that appeared in the included studies.

Results

Descriptive Information

In concordance with the PRISMA framework, we created a flow diagram (Figure 2.1) to represent the number of studies identified and diagram the process of inclusion and exclusion. We identified a total of 4,766 articles after searching for articles using the 5-keyword phrases within the 4 search databases. We identified 28 published sources addressing parents' perceptions of infant emotions (Table 2.1) after excluding articles through abstract and full text

screening based on the exclusion criteria. Of the 28 publications, 12 articles were published by researchers in the U.S. and included participants from the U.S., 10 by researchers in Europe that included European participants, 2 articles by researchers in Canada that included Canadian participants, 1 article by a researcher in New Zealand that included participants from New Zealand, 1 article from a U.S. researcher that included participants from Samoa, 1 article from U.S. researchers that included participants from Central Africa, and 1 article from a German researcher that included participants from Taiwan and Madagascar. Thirteen studies did not report the race or ethnicity of participants, 9 studies included majority European American participants or participants of European origin and 2 studies included approximately equal numbers of European American participants and Hispanic or African American participants. The 3 ethnographic studies included 1) Samoans, 2) Tao, 3) Bara, and 4) Bofi foragers and farmers, Ngandu farmers, and Aka foragers. Thirteen studies included only mothers, 9 studies included both fathers and mothers (the number of fathers was usually substantially lower than the number of mothers), and 6 studies stated that both fathers and mothers participated but did not include the number of both mothers and fathers. Seventeen articles only included parents and 11 articles included both parents and nonparents (6 of these articles made comparisons between parents' and nonparents' perceptions). Nineteen articles were cross-sectional, 3 were longitudinal, 1 dissertation (longitudinal) was included, 1 study was qualitative, and there were 3 ethnographic studies that included interviews and participant observations. Articles were published in journals across a variety of disciplines in a fairly balanced way (i.e., anthropology, psychology, psychobiology, infant development, etc.). Even though articles were organized by findings in their respective fields of study, many articles transcended multiple fields because of their procedures and instruments used. For example, 4 articles included the Adult Attachment

Interview (AAI; measures adult attachment security); however, 2 of these studies included neurophysiological measures and were reviewed with the other studies using neurophysiological measure of parents' perceptions. One study that looked at parental risk factors (e.g., negative intimate partner experiences) contributing to variation in perceptions of infant crying used the Maternal Behavior Q-sort (a measure of sensitivity and responsiveness to infants used in studies on attachment). Two studies categorized in different themes used the Infant Crying Questionnaire to investigate parent-oriented and infant-oriented beliefs about crying (one article also investigated neurophysiological responses to infant crying). Furthermore, many other instruments like the IFEEL picture task were used across disciplines. These examples demonstrate that many of the articles include measures that are utilized across disciplines further highlighting the need for this systematic review and a trans-disciplinary approach to the study of perceptions of infant emotions.

The articles included in this study were organized into 5 themes based on the findings: 1) socio-cultural values contributing to emotion socialization and perceptions of emotions (7 articles), 2) the effects of parental experience on perceptions of infant emotion (6 articles), 3) parental factors contributing to variation in perceptions of infant crying (6 articles), 4) attachment and perceptions of infant emotion (3 articles), and 5) perception of infant emotion and corresponding neurophysiology (6 articles). In the following sections, the reviewed articles are discussed according to theme followed by a discussion and call for trans-disciplinary approaches to the study of parents' perceptions of infant emotions. Table 2.1 also includes each article and corresponding theme (condensed wording) associated with the article.

Socio-Cultural Values Contributing to Emotion Socialization and Perceptions of Emotions

Articles that discussed cultural underpinnings of perception of emotion made up about a quarter of all of the articles reviewed; however, only 3 of these articles included long-term investigations (i.e., ethnographic studies that included interviews and participant observations) into how cultural values and practices influence parents' perceptions of their infants' emotions. One article was a qualitative study, and 3 articles looked at association between gender and age and parents' perceptions.

Culture is influential in the many aspects of mental functioning (Vygotsky, 1978) including emotion socialization (Halberstadt & Lozada, 2011; Keller & Otto, 2009; Parker et al., 2012) and how parents perceive their infants' emotions is a part of emotion socialization. Seven articles made the case that cultural values and practices are extremely influential in parents' perception of infant emotion in order to understand parental responsiveness. Furthermore, these articles together exemplify that parents' perceptions about their infants' emotions are rooted in cultural practices and seem to vary across cultures. Parents' perceptions about their infants' emotions also include cultural beliefs about age and gender as the following two articles demonstrate.

Plant, Hyde, Keltner, and Devine (2000) found that U.S. men who were expectant parents and endorsed gender stereotypes of emotions (i.e., women express more fear and sadness and men express more anger) were more likely to rate a male infant's ambiguous emotion as anger in a video clip of an infant screaming and crying. Taumoepeau and Ruffman (2006) found that mothers' (New Zealand) emotion word use was more commonly used among younger infants, and younger infants whose mothers used more emotion words were more likely to use this same language to describe their emotions at an older age (Taumoepeau & Ruffman, 2006). This

suggests that mothers' emotion word use in reference to their infants' emotions impacted infant word learning as infants were more likely to use words that they heard in their everyday environment (Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991). Emotion language use by parents directed towards infants appears to affect how children express their emotions and what language they themselves will use to describe their emotions. Furthermore, cultural norms (i.e., gender stereotypes) may influence the emotional displays that are deemed appropriate by children.

Cross-cultural comparisons of parents' perceptions of infants' emotions are rare. We found two articles that compared mothers' interpretations of infants' emotions cross-culturally. It appears that standardized methods to compare perception of emotion across cultures may be difficult to utilize. Hiltunen, Moilanen, Szanjberg, and Gardner (1999) compared Croatian, Finnish, and American mothers' feelings about infant emotions displayed in the Infant Facial Expressions of Emotion from Looking at Pictures (IFEEL) (Emde, Osofsky, & Butterfield, 1993) pictures 2-3 days following the birth of their own infants. IFEEL are a set of pictures of different infant emotional expressions that mothers are asked to describe with one word the feeling of the infant in the picture (Emde et al., 1993). The IFEEL test was originally created to measure parents' variation in arousal level and valence of their perceptions of a range of infant emotions (Emde et al., 1993). The IFEEL test has commonly been used to identify mothers' perceptions of their infants' emotions in studies on infant-mother attachment, adult attachment representations, and early childhood experiences on parenting (DeOliveira, 2001). Unlike the consistent agreement between perceptions of adult emotions cross-culturally (Ekman, 1993; Izard, 1994), Finnish mothers perceived more shyness and disgust and less distress, joy, interest, passivity, and sadness compared to Croatian mothers; Finnish mothers also reported less distress

and more surprise than American mothers (Hiltunen et al., 1999). Hiltunen and colleagues (1999) discussed difficulty in translating many of the English emotion words into words reflecting the same emotion in another language suggesting that cross-cultural variations in perceptions of infant emotions may not be best elucidated by this type of task.

Röttger-Rössler, Scheidecker, Funk, and Holodynski (2015) found connections between cultural values and caregivers' responses to infants between 2 different cultures, the Tao (Taiwan) and Bara (Madagascar), during 12 months of fieldwork that also included interviews with caregivers and participants obeservations. Unlike Hiltunen and colleagues (1999), the study by Röttger-Rössler was ethnographic and included interviews with adults and spot and event episodes of infants' emotion episodes. Comparisons between Tao and Bara adult perceptions of infant emotion showed that cultural values are linked to what adults expect from young children in terms of emotional display.

Single culture studies (i.e., mainly ethnographic studies and one non-ethnographic qualitative study) provided much more in-depth information on parents' perceptions of infants' emotions including connections between caregivers' perceptions of infants' emotions and core cultural values and parenting goals. Furthermore, these studies obtained parents' subjective interpretations of infants' emotions, which was not common in many of the other articles. For example, through 24 months of fieldwork that included participant observations and interviews with caregivers, Odden (2009) found that Samoans valued emotional self-control, which could be linked to caregivers' contingent responses to their infants' needs by attending to them before the infants cried to elicit attention from their mothers. Fouts, Hewlett, and Lamb (2012) found that Aka and Bofi forager mothers responded to infant fussing and crying immediately due to the fear that infant fussing and crying may lead to illness which is not surprising considering the

harsh environment of the Bofi and Aka which includes high infant mortality and low socio-economic conditions.

One non-ethnographic qualitative study also included in-depth information regarding parents' perceptions of infant emotions through interviews with parents that elicited subjective interpretations of infant emotions as well as information regarding core cultural values and practices. Suizzo (2004) found in a qualitative study that included interviews with Parisian mothers that mothers believed that a child's emotional state predicted well-being and mothers often expressed that their children's emotional health was important. Mothers expressed that if an infant was happy and emotionally stable, other areas of development including motor and cognitive would catch up should there be a delay (Suizzo, 2004). Furthermore, Parisian mothers valued infant self-regulating behaviors; hence, an infant that does not cry a lot and is able to sleep through the night is expected; however, mothers did value alert and curious infants and one mother described that her infant cried a lot in order to "assert her presence" (Suizzo, 2004). Parisian mothers believed that alert and curious infants have emotional stability necessary for healthy adult development (Suizzo, 2004).

These articles highlight the links between cultural factors and parents' perceptions of their infants' emotions and demonstrate the links between cultural values and practices and what parents think about their infants' emotional displays. Furthermore, cultural factors appear to influence what parents expect in regards to their emotional displays and how parents respond.

The Effects of Parenting Experience on Perceptions of Infant Emotion

A little less than a quarter of the studies included in this review looked at the differences in perceptions of infants' emotions between parents and nonparents. The authors of these six articles were interested in the role of parental experience in perception of infant emotion and if

being a parent was necessary to accurately identify infants' emotions. Early on in infancy, parent-infant synchrony develops in which the infant signals for need and the parent responds and suggests that parental experience is necessary to accurately interpret infants' emotions (Feldman, 2007).

Parent-infant synchrony, the temporal coordination between parent and infant social behavior, is known to develop following birth and promote healthy social-emotional development in infants (Feldman, 2007). Thus, parents learn what infant signals mean and how to respond. However, parents as well as non-parents may be able to accurately identify infant signals. Lindová, Špinka, and Nováková (2015) found that Czech parents and non-parents were equally able to distinguish between recordings of positive and negative infant sounds and had similar intensity and valence ratings (7-point Likert scales), but that parents of infants were more accurate at identifying situations (e.g., pain, play, demand for food, etc.) that elicited certain infant vocalizations. Green, Jones, and Gustafson (1987), using multidimensional scaling, found subtle differences between U.S. parents and nonparents (college students) on perceived aversiveness, possible caretaking responses, and affective responses to recordings of hungry infants' cries (measured on 7-point Likert scale), and Leger and colleagues (1996) found that U.S. parents and nonparents (college students) did not differ on perceived anger, fear, and distress (7-point Likert scale) on recordings of spontaneous cries from infants. Leger and colleagues (1996) suggested that perceptions of infant cries may be an innate human characteristic. Furthermore, Messinger and colleagues (2008) used still face images of infants' smiles to look for variation in observers' perceived positive emotion (e.g., joy, happiness, positive feeling, etc.) between U.S. parents and non-parents (college students). Interestingly, experienced observers (i.e., parents) and inexperienced observers (i.e., non-parents) described

similar responses to infant smiling on the degrees of joy, happiness, positive feeling, arousal, and excitement in the images of smiling infants (Messinger et al., 2008).

Kamel and Dockrell (2000) compared UK mothers and mostly non-parent observers' (college students; men and women) perceptions of infant emotions in face-to-face interactions between the mothers and their infants and found that mothers' descriptions of infants' emotional states and corresponding facial expressions reflected the context of the mother-infant dyad (e.g., negative emotional state and facial expression during prohibitive toy play), whereas non-parents' descriptions were less likely to reflect context. Overall, it appears that being a parent is not associated with different perceptions of infants' emotions; however, parents may be more accurate at identifying the needs of infants through their emotional displays because they consider the context in which the infant's emotions was elicited.

Parental Factors Contributing to Variation in Perceptions of Infant Crying

Six studies investigated parent characteristics (i.e., psychosocial stress and risk fators, early life experiences with emotion minimization) that contributed to variations in perceptions of infants' emotions and in subsequent sensitive and responsive parenting. For example, Lin, Manuel, McFatter, and Cech (2016) investigated the perception of infant distress (i.e., perceived aversiveness) and affect-related processes (i.e., empathic concern and personal distress) to infant crying in a sample of female and male college students. Perceived aversiveness refers to the beliefs that a listener has about an infant cry and not the aversion that the listener feels towards the crying infant (Lin et al., 2016). Empathic concern refers to the ability to experience the affective state of another and is associated with social helping (Zahn-Waxler & Radke-Yarrow, 1990). According to Leerkes and Crockenberg (2006), empathic concern for a crying infant includes sympathy, care, compassion, sadness, etc., and is believed to underlie sensitive and

responsive parenting (Leerkes et al., 2010). Prolonged infant crying can elicit negative emotions and heightened physiological arousal (Frodi, 1985), and consequently, distress processes including anxiety, anger, aversion, etc., may be provoked (Frodi & Senchak, 1990; Zeskind & Lester, 1978). However, these distress processes may elicit egoistic motivations (rather than empathic concern) that attempt to reduce one's own arousal (Batson & Shaw, 1991) and this could result in a lack of sensitivity towards infants' signals (Crockenberg & Leerkes, 2003). Lin and colleagues (2016) found a moderating effect of personal distress on the relationship between empathic concern and perceived aversiveness. This suggests that sensitive caregivers (high levels of empathic concern and perceived aversiveness) may be able to regulate their internal egoistic motivations to relieve their personal distress and elicit motivations that benefit the infant in distress (Lin et al., 2016).

Zeifman (2003) found that fathers and mothers (sample was majority Caucasian and born in U.S.) with high levels of trait conscientiousness and parent-centered (e.g., "babies should be fed on a fixed time schedule") attitudes were more likely to perceive infant fussing and crying as manipulative; however, Leerkes and colleagues (2010) found that attitudes about infant crying could shift depending on one's partner's attitude and Dayton, Huth-Brocks, and Bursuito (2016) reported that cry beliefs were influenced by parents' psychosocial traumas. Parents with infant-centered attitudes (e.g., "babies should be fed whenever they want") were more likely to perceive infant distress signals as the infant's call for immediate attention (Zeifman, 2003). Furthermore, parents with more parent-centered beliefs about infants reported a longer latency to respond to distressed infants (Zeifman, 2003).

Leerkes and colleagues (2010) found that at 6 months postpartum, U.S. mothers (85% White) self-reported more infant-oriented cry beliefs than fathers. Furthermore, both mothers

and fathers that had experienced emotion minimization in childhood were more likely to have parent-oriented beliefs (i.e., minimizes crying of distressed infant; ex. children cry for attention and should be ignored) about infant crying (Leerkes et al., 2010). If fathers possessed parent-oriented beliefs, mothers were more likely to endorse parent-oriented beliefs as well and for mothers who had experienced emotion minimization, their beliefs were more likely to be parent-oriented only if their partners did not hold infant-oriented beliefs (Leerkes et al., 2010). Furthermore, Dayton and colleagues (2016) found that U.S. mothers exposed to many psychosocial stressors (e.g., interpersonal aggression and psychological abuse) were more likely to perceive fear, anger, and distress (negative attribution bias) during the IFEEL picture task and were less sensitive towards their infants suggesting that these mothers may demonstrate increased emotional contagion in response to an infant's negative emotion resulting in less sensitive parenting.

Mothers' and fathers' cry beliefs appear to be overwhelmingly linked to their early life experiences with their parents. Furthermore, exposure to psychosocial stressors is associated with a negative attribution bias about infant crying among mothers. Thus, perceptions of infant emotions among mothers and fathers may be influenced by their early environment, their parents' beliefs about their infants' emotions, and their parents' sensitivity and responsiveness. Furthermore, this research supports the idea that early attachment relationships are linked to subsequent parenting beliefs and practices in adulthood.

Attachment and Perceptions of Infant Emotion

Many articles (i.e., 8 articles) throughout the review used measurements of adult attachment or mother-infant attachment (i.e., AAI, Maternal Behavior Q-sort, Infant Crying Questionnaire, Strange Situation) to help understand perceptions of infants' emotions

neurophysiologically or the link between the early attachment relationship and psychosocial risk factors on perceptions; however, three articles focused solely on the effects of the early attachment relationship (i.e., secure, insecure, earned secure) between parent and infant and how it was linked to perceptions of infants' emotions and how these early relationships were linked to future parenting.

Parent-infant synchrony, the foundation of attachment theory, suggests that parents understand the needs of their infants through emotional signals (Feldman, 2007); however, the physical characteristics of infants (e.g., rounded cheeks and large eyes) initially motivate parental caregiving in what Lorenz (1971) called *Kindchenschema* (baby schema). Baby schema elicits human caregiving through the neurophysiologic activation of the mesocorticolimbic system, which is involved in reward processing and appetitive motivation (Glocker et al., 2009). Mother-infant attachment and mothers' internal working models (IWMs) seem to affect how mothers perceive their infants' cries (Bell & Ainsworth, 1972).

Beliefs about infant crying and appropriate responses towards infants can influence how mothers themselves feel in response to their infants' cries. Haltigan and colleagues (2012) found that U.S. mothers demonstrating a higher score on attachment beliefs (e.g., "I will make baby feel safe and secure") surrounding infant crying and beliefs that infants are communicating with their mothers by way of crying, felt more empathic during videos of infant crying 6 months following the birth of their own infants (Haltigan et al., 2012). Furthermore, mothers' adult attachment representations may be linked to mothers' internal feelings about their infants' cries.

According to Bowlby (1980), IWMs molded from early experiences can change and sometimes this change may be positive from an insecure to a secure ("earned secure") IWM. Furthermore, adults with "earned secure" IWMs are as sensitive and responsive to children as

secure adults (Phelps, Belsky, & Crnic, 1998). Leerkes and Siepak (2006) found that an "earned secure" IWM resulted in a buffering effect on early maternal emotional rejection. U.S. female undergraduate students who were classified as secure in their adult attachment were accurate in identifying infant fear (video clip of infant crying out of fear) and were less likely to express amusement in response to videos of infants crying compared to participants who had experienced maternal emotional rejection in childhood and were categorized as insecure in their adult attachment (Leerkes & Siepak, 2006). Furthermore, DeOliviera (2001) found that Canadian mothers classified as *unresolved* (experiences of trauma and loss) from the AAI were less accurate at identifying surprise, passivity, and shame in infants' pictures (IFEEL) and had more atypical responses than mothers that had not experienced trauma. Atypical responses refer to when mothers in DeOliviera's (2001) study used an emotion description that was used less than 5% of the time in a reference sample from Emde, Osofsky, and Butterfield (1993). *Preoccupied* mothers (mothers that expressed confusion, anger, passivity, and distress when discussing their attachment figures) had a greater number of atypical responses as well (DeOliveira, 2001).

In summary, parents' attachment representations in adulthood are linked to perceptions of infants' emotions. Early secure attachment relationships are associated with parents' ability to accurately identify infants' emotions and report feeling empathy towards infants' cries; however, some individuals classified as *earned secure* have adult attachment relationships that appear to be different than their early attachment experiences (i.e., insecure mother-infant attachment) and are linked to their perceptions of infants emotions that reflect secure adult attachment representations. Overall, it appears that attachment relationships in childhood and adult attachment representations are inextricably linked to how parent' perceive their infants' emotions.

Perceptions of Infant Emotion and Corresponding Neurophysiolog

A little less than a quarter of the reviewed articles investigated the neurophysiology associated with perceptions' of infants' emotions. Two articles investigated the link between neurophysiological activity and adult attachment representations. Overall, differences in neurophysiological activity appear to be associated with variation in subjective perceptions of infants' emotions.

Krippl and colleagues (2010) have argued that research on perceptions of infant emotions has either investigated subjective interpretations of infant emotions or neurophysiological responses to infant smiling or crying without taking a combined approach. However, some studies that have investigated psychophysiological responses to infant emotion have included a measure of parents' perception of their infants' emotion (Barrett et al., 2012; Leerkes et al., 2016). For example, Barrett and colleagues (2012) investigated the relationship between Canadian mothers' mood and anxiety and perceptions of infant affect and brain activation through neuroimaging in response to infants' emotional displays. Activation of the amygdala, an area of the brain involved in mood states, experiences with anxiety, and the processing of emotional information (Nitschke et al., 2004; Savitz & Drevets, 2009), is thought to be involved in the motivation of maternal behavior (Barrett et al., 2012). Barrett and colleagues (2012) found that mothers felt more positive in response to positive pictures of their own infants and more negative in response to pictures of their infants displaying negative affect compared to pictures of unfamiliar infants with the same emotional displays. Furthermore, mothers demonstrated higher amygdala activity in response to pictures of their own infants' positive facial expressions and enhanced amygdala activity in response to positive facial expressions was associated with

lower anxiety, distress, less symptoms of depressed mood and more positive attachment-related feelings about infants' emotions (Barrett et al., 2012).

Maternal attachment representations identified through the AAI have been shown to influence the processing of infant emotion in the maternal brain (Leyh et al., 2016; Spangler et al., 2010). Mothers with secure attachment representations were more accurate in their identification of positive, negative, and neutral infant emotions (Leyh et al., 2016). At the neurophysiological level, secure and insecure mothers demonstrated variations in electrophysiological responses to stimuli that suggest that secure mothers may be better able to focus on the emotional signals of their infants compared to insecure mothers (Leyh et al., 2016). Leyh and colleagues (2016) also concluded that secure German mothers were better at processing infant faces compared to insecure mothers as well as identifying infant emotion behaviorally. This study further supports the relationship between parents' attachment representations measured in the AAI and the relationship between parent and infant (for review see van Ijzendoorn, 1995).

In contrast, Spangler and colleagues (2010) found that adult attachment representation did not predict German mothers' and fathers' perceptions of valence and arousal of positive, negative, and neutral faces in pictures of their own infants that argued for less variation in parents' conscious perceptions of their infants' emotions. Spangler and colleagues (2010) also suggested that measures of parental sensitivity to infant emotion are better analyzed through procedural responses (behavioral-expressive or mimic responses) to infant emotion. However, correlations between perceived valence and arousal in infant pictures and self-experienced (what the authors call "emotional contagion") valence and arousal in response to the pictures were found among secure adult attachment representations (Spangler et al., 2010). At the

physiological level, only *dismissing* parents demonstrated a larger startle reflex (eye-lid reflex elicited during and acoustic startle probe) from positive to negative pictures suggesting that pictures of negative infant emotion are negative stimuli to these parents (Spangler et al., 2010) and according to attachment theory may cause these parents to disregard the needs of a distressed infant (van Ijzendoorn, 1995). However, parents with secure attachment representations may have an appetitive system (motivational system that includes approach behaviors in order to reach a positive outcome) that dominates their aversive system (motivational system that includes avoidant behaviors in order to prevent a negative outcome), demonstrated in a reduced startle reflex, which leads parents to perceive their infants' negative emotions as a call for help and comfort (Spangler et al., 2010). According to Spangler and colleagues (2010), parents with insecure attachment representations may not regard their infants' negative emotions as a social signal and a signal of need.

Other physiological measures besides the startle reflex have also been linked to perceptions of infant emotion, particularly beliefs about infant crying. Leerkes and colleagues (2016) looked at how physiological measures were linked to mothers' beliefs about infant crying. Skin conductance level (SCL), a measure of emotional arousal elicited through activation of the sympathetic nervous system (for review see Stern, Ray, & Quigley, 2001) has been found to be higher in response to infant crying among abusive parents (Frodi & Lamb, 1980). Respiratory sinus arrhythmia (RSA), a measure of vagus nerve activity and the parasympathetic nervous system, decreases during stressful events, which is believed to represent an individual's control of emotional arousal (Porges, 2007). Decreases in RSA activity (i.e., vagal regulation) during cry stimuli are linked to more sensitive parenting (Joosen et al., 2013). Similarly, Leerkes and colleagues (2016) found that U.S. mothers' physiological arousal (SCL) was associated with

higher infant-oriented cry beliefs (i.e., empathy and concern for infants measured through the Infant Crying Questionnaire) when regulation (RSA suppression) was high.

In summary, it appears that mothers and fathers with secure attachment relationships may be better at identifying and responding to infants' emotional signals. Furthermore, control of emotional arousal appears to be linked to mothers' empathy for infants when they cry, and increased amygdala activity during positive emotional stimuli is associated with reduced maternal distress. Neurophysiological reactions to infants' emotions reflect similar patterns in mothers' and fathers' voiced perceptions of infants' emotions.

Discussion

Collectively, the reviewed studies demonstrate the complexity of one particular aspect of parenting: perceptions of infants' emotions. In particular, the review highlighted how multiple factors are linked to parents' perceptions of infants' emotions, including cultural values and practices, and parents' early experiences and attachment relationships. Neurophysiological studies have also shown what perceptions of infant emotions look like in the brain and how neurophysiological reactions to infant emotion are associated with parents' experiences in childhood and adult attachment representation (Barrett et al., 2012; Leerkes et al., 2016).

The results of this systematic review indicate a need for a trans-disciplinary approach to the study of parents' perceptions of infants' emotions. Multiple fields (i.e., development, neuroscience, and anthropology) have investigated perceptions of infants' emotions through different lenses and using different methodologies. Some studies in our systematic review did demonstrate trans-disciplinary approaches; however, this appeared to only be done in articles looking at the links between neurophysiological responses to infant emotion and attachment (Leyh et al., 2016; Spangler et al., 2010). Even though articles were distributed relatively evenly

between themes, attachment perspectives appear to dictate the literature on parents' perceptions of infants' emotions (i.e., most of the neurophysiology articles utilized an attachment perspective to help explain findings). Furthermore, articles investigating the link between cultural values and practices and perceptions of infants' emotions are not as common as other perspectives. Studying the effects of cultural values on parents' perceptions of infants emotions is important because cultural factors may interact with many of the other factors (i.e., psychosocial risk factors, parental experience) discussed in the literature to influence how parents perceive their infants' emotions.

We reviewed 4 important points about current research on parents' perceptions of infants' emotions that are addressed in the following discussion: 1) cultural studies, including non-ethnographic qualitative studies and ethnographic studies are less common perspectives used to study parents' perceptions of infants' emotion and cross-cultural studies are rare, 2) studies of mothers' perceptions of infants' emotions and studies that include predominantly European Americans as participants dominate the literature, 3) non-parents may be just as good at accurately perceiving infants' emotions as parents, and 4) a trans-disciplinary approach to the study of perceptions of infants' emotions is needed.

Cultural Studies

Perception of emotion is intricately linked to cultural values and beliefs, which was demonstrated in the ethnographic studies (Odden, 2009; Röttger‐Rössler et al., 2015; Suizzo, 2004) and studies on emotion socialization (Plant et al., 2000) and further discussed in Hiltunen and colleagues' (1999) cross-cultural study. Furthermore, we only found two cross-cultural studies on parents' perceptions of infants' emotion. Even though Hiltunen and colleagues (1999) discussed the difficulty in conducting cross-cultural studies on this particular phenomenon, more

studies like this are needed to help expand current ideas about parents' perceptions of infants' emotions that mostly stem from studies conducted in Western-contexts of development and predominantly include European American participants. Specifically, cross-cultural studies have shown that variation exists in other aspects of parenting and infant care including beliefs about the parent-child relationship (Keller, Voelker, & Yovsi, 2005), the socialization goals of parents (Carra, Lavelli, Keller, & Kartner, 2013) breastfeeding and weaning (Fouts, Hewlett, & Lamb, 2005; Fouts, Hewlett, et al., 2012), and more broadly, parental investment strategies (Hewlett, Lamb, Leyendecker, & Schölmerich, 2000b). Studies like these have challenged dominant models of parenting as well as supported certain universal claims (i.e., secure base phenomenon) and cross-cultural studies on parents' perceptions of infants' emotions could contribute similarly. Thus, our review overall did not include many articles that looked at the role of cultural values and practices in parents' perceptions of infants' emotions. However, cultural differences in brain responses and activity have been the focus of research in the emerging field of cultural neuroscience (for review see Chiao, 2009). A few studies have even demonstrated cultural differences in emotion perception in brain areas associated with emotion recognition (for review see Chiao, 2009); however, in the studies we reviewed, cultural variation in neurophysiological responses to infant emotion was not investigated. This emerging research in cultural neuroscience suggests that cultural variation in perceptions of infants' emotions may be associated with variation in neurophysiological responses. Thus, more studies that include in-depth investigations into the links between cultural values and practices and perceptions of infants' emotions are needed to help understand variation in perceptions of infants' emotions at the neurophysiological level. Collaborative research between cultural psychology or

anthropology and neuroscience would be beneficial to empirically link current findings on perceptions of infants' emotions from these different fields.

Furthermore, the studies that utilized attachment classifications (i.e., insecure, secure) to investigate perceptions of infant emotions (DeOliveira, 2001; Haltigan et al., 2012; Leerkes & Siepak, 2006) included participants from the U.S. and Canada, and we know that some of these classifications are not generalizable to mother-infant relationships in all cultures (Rothbaum & Morelli, 2005). Comprehensive studies among people from an array of cultures, other than Western contexts of infant development, which are the focus in much of the literature, could help illustrate the nature (i.e., how responsive mothers are to infants' emotional displays) of mother-infant relationships within those cultures. This would pave the way for research that attempts to understand how parent-infant relationships are linked to parents' perceptions of their infants' emotions in different cultures.

Mothers' and European Americans' Perceptions

Mothers' perceptions of their infants' emotions dominated the research included in this review and this was evident across themes. This is not surprising considering that mothers are considered secure bases for their infants' across cultures (Posada et al., 2013). However, in some cultures, fathers are highly involved in infant care (Hewlett, 1991). Lamb and Lewis (2013) discussed how fathers contribute differently to infant social-emotional development compared to mothers and that their interactions with their infants are just as important as maternal interactions. Fathers have been shown to give more attention to male infants compared to female infants throughout infancy and fathers are known for their playful behavior around infants (for overview see Lamb & Lewis, 2013). Given that fathers often contribute in important

ways to their infants' social-emotional development, fathers' perceptions of their infants' emotions should be considered in future research.

Even though some of the reviewed studies included fathers, their perceptions were often combined with mothers' perceptions and no attempt was made to look for variation between mothers' and fathers' perceptions of their infants' emotions (Spangler, Geserick, & von Wahlert, 2005; Spangler et al., 2010). One study did find that fathers with more gender-stereotyped beliefs about emotional displays were more likely to perceive male infants' ambiguous emotions as reflecting gender stereotypes about emotions (i.e., men display more anger) (Plant et al., 2000). More studies are needed to investigate how fathers' perceptions of infants' emotions differ from mothers' perceptions and how other factors like fathers' early life experiences or attachment representations are linked to these perceptions. So far, the current literature appears to generalize findings on mothers' perceptions of their infants' emotions and their antecedents to fathers rather than including fathers or including fathers as separate participants in studies.

European American parents' perceptions of their infants' emotions were also overrepresented in the reviewed studies. Moreover, European American participants are overrepresented in general in the behavioral sciences even though this population makes up a minority of the world's population (Henrich et al., 2010). Findings from these studies are often mistakenly generalized to populations around the world (Henrich et al., 2010) According to Henrich and colleagues (2010) participants from Western, Educated, Industrialized, Rich, Democratic (WEIRD) societies are the least representative of behavior across the world because the majority of the world does not reside in these societies. Thus, universal claims about human behavior, including aspects of child development, are unwarranted (Henrich et al., 2010).

The overrepresentation of European Americans in our review is problematic because results from these studies may not be generalizable to non-European American parents and their infants. More ethnographic studies among non-European origin contexts of development would provide a more balanced representation of perceptions' of infants' emotions across ethnicities. Current research may not support findings on parents' perceptions of infants' emotions in lesser-studied contexts of infant development. Research in these contexts is needed to understand if certain aspects of parents' perceptions of their infants' emotions are universal and what may be particular to various cultural contexts. .

Non-Parents' Perceptions

The studies on the effects of parental experience and the perceptions of infants' emotions demonstrate that parental experience may not have a large effect on how infant emotion is accurately perceived or identified (Lindová et al., 2015; Messinger et al., 2008; Papoušek, 1989); however, being a parent does appear to be influential in determining what an infant needs based on their emotional displays (Kamel & Dockrell, 2000). This suggests that the context (e.g., play interaction) in which infants display emotion is necessary to predict infant emotional state and parents may be better at considering context in their evaluations of infant emotion.

However, this research on the effects of parental experience on perceptions is interesting because even though parents are oftentimes the primary caregivers of their infants, extensive caretaking by other individuals is common in non-Western infant caregiving contexts (Fouts & Lamb, 2009; Ivey, 2000; Weisner et al., 1977). Furthermore, the biobehavioral synchrony (the coordination between parent and infant social behavior) that is usually described as existing between parents and infants (Feldman, 2007) may be applicable to other individuals besides parents. Interestingly, outside of the industrialized world, older siblings are sometimes the

primary caretakers of infants (Fouts & Lamb, 2009; Ivey, 2000; Weisner et al., 1977), so it's possible that a synchronous relationship between infants' signals and sibling caretakers' responses develops. Thus, because the existing literature has demonstrated that non-parents may be just as accurate at perceiving infants' emotions, it would be interesting to investigate sibling caretakers' perceptions of infants' emotions to see how they compare to parents' perceptions. Again, because sibling caretaking is vital in some non-Western cultural contexts, trans-disciplinary approaches to parenting and infant care that focus on perceptions of infants' emotions are needed to identify similarities and difference in parents' and siblings' perceptions of infant emotions.

Trans-Disciplinary Approach

A trans-disciplinary approach to the study of parents' perceptions of infants' emotions would help provide understanding of the complexity and the connections between factors involved in this particular aspect of parenting and infant care. For example, more studies investigating the roles of cultural values and early life experiences in parents' perceptions of infants' emotions would contribute to the already abundant research that has linked attachment perspectives to variation in parents' perceptions about their infants' emotions. This systematic review highlighted the fact that parents' perceptions of infants' emotions have been investigated by a diverse set of disciplines (i.e., child development / developmental psychology, neuroscience, and anthropology) and some studies, although few, have demonstrated a trans-disciplinary approach (Leyh et al., 2016; Spangler et al., 2010). Leyh and colleagues (2016) and Spangler and colleagues (2010) were able to provide information about perceptions of infants' emotions from more than one perspective. They were also able to demonstrate connections between different disciplines of research (i.e., neurophysiology and attachment) and findings

from different methodologies (startle reflex, electrophysiology, and the AAI) (Leyh et al., 2016; Spangler et al., 2010). More studies like these that utilize trans-disciplinary perspectives and methodologies (i.e., the AAI and neurophysiological indicators of perceptions of emotions) are needed to better understand parents' varying perceptions on their infants' emotions and how these perceptions lead to different responses to infants. These studies could help explain for example how and why certain attachment classifications are associated with neurophysiological responses to infants' emotions. A trans-disciplinary approach would provide a better understanding of the connection between factors that predict parents' perceptions of their infants' emotions, how parents perceive their infants' emotions, and how this contributes to responses to infants' emotions.

Conclusion

Parenting and infant care are multifaceted and this review demonstrates that parents' perceptions about their infants' emotions appear to be complex as well. Combining methodologies from different fields of study may help to provide better understanding of why parents' hold certain perceptions about their infants' emotions. Furthermore, additional theoretical perspectives (i.e., cultural perspectives) would complement research guided by attachment theory and could shed new light on this phenomenon. A trans-disciplinary approach to the study of parents' perceptions of their infants' emotions may provide a more holistic understanding to this particular aspect of parenting and infant care.

Limitations

One limitation of this study is that we did not include studies on parents' perceptions of infants' emotions among infants with developmental delays (i.e., preterm infants) or infants with developmental disorders (i.e., autism). These studies could provide another area of research to

add to our proposed trans-disciplinary approach to the study of parents' perceptions of infants' emotions. Furthermore, search terms in our review all included the word *parent*. We may have identified articles that included other primary caregivers' perceptions of infants' emotions had we used different search terms. This would have addressed our discussion about cultures in which parents are not the sole primary caregivers of infants.

References

Barrett, J., Wonch, K. E., Gonzalez, A., Ali, N., Steiner, M., Hall, G. B., & Fleming, A. S. (2012). Maternal affect and quality of parenting experiences are related to amygdala response to infant faces. *Social Neuroscience, 7*(3), 252-268.

Batson, C. D., & Shaw, L. L. (1991). Encouraging words concerning the evidence for altruism. *Psychological Inquiry, 2*(2), 159-168.

Bell, S. M., & Ainsworth, M. D. S. (1972). Infant crying and maternal responsiveness. *Child Development*, 1171-1190.

Bowlby, J. (1980). *Attachment and loss. Vol. 3: Loss: Sadness and depression*. New York: Basic Books.

Carra, C., Lavelli, M., Keller, H., & Kartner, J. (2013). Parenting Infants: Socialization Goals and Behaviors of Italian Mothers and Immigrant Mothers From West Africa. *Journal of Cross-Cultural Psychology, 44*(8), 1304-1320. doi:Doi 10.1177/0022022113486004

Chiao, J. Y. (2009). Cultural neuroscience: A once and future discipline. In J. Y. Chiao (Ed.), *Cultural neuroscience - Cultural influences on brain function* (pp. 287-304). New York, NY: Elsevier.

Crockenberg, S. C., & Leerkes, E. M. (2003). Negative infant emotionality and the development of family relationships in infancy and early childhood. In A. C. Crouter & A. Booth (Eds.), *Children's influence on family dynamics: The neglected side of family relationships* (pp. 57-78). Mahwah, NJ: Erlbaum.

Dayton, C. J., Huth-Bocks, A. C., & Busuito, A. (2016). The influence of interpersonal aggression on maternal perceptions of infant emotions: Associations with early parenting quality. *Emotion, 16*(4), 436-448.

DeOliveira, C. A. (2001). *Understanding the function of emotions within the framework of attachment organization.* (Doctoral dissertation), The University of Western Ontario, London, Ontario.

Eid, M., & Diener, E. (2001). Norms for experiencing emotions in different cultures: inter-and intranational differences. *Journal of Personality and Social Psychology, 81*(5), 869.

Ekman, P. (1993). Facial expression and emotion. *American Psychologist, 48*(4), 384.

Emde, R. N., Osofsky, J. D., & Butterfield, P. M. (1993). *The IFEEL pictures: A new instrument for interpreting emotions*. Madison: International University Press, Inc.

Feldman, R. (2007). Parent–infant synchrony biological foundations and developmental outcomes. *Current Directions in Psychological Science, 16*(6), 340-345.

Fouts, H. N., Hewlett, B. S., & Lamb, M. E. (2005). Parent‐Offspring Weaning Conflicts among the Bofi Farmers and Foragers of Central Africa. *Current Anthropology, 46*(1), 29-50.

Fouts, H. N., Hewlett, B. S., & Lamb, M. E. (2012). A biocultural approach to breastfeeding interactions in Central Africa. *American Anthropologist, 114*(1), 123-136.

Fouts, H. N., & Lamb, M. E. (2009). Cultural and Developmental Variation in Toddlers' Interactions With Other Children in Two Small-Scale Societies in Central Africa. *International Journal of Developmental Science, 3*(4), 389-407. doi: 10.3233/DEV-2009-3405.

Friedlmeier, W., & Trommsdorff, G. (1999). Emotion Regulation in Early Childhood A Cross-Cultural Comparison between German and Japanese Toddlers. *Journal of Cross-Cultural Psychology, 30*(6), 684-711.

Frodi, A. (1985). When empathy fails: Aversive infant crying and child abuse. In B. M. Lester & C. F. Zachariah Boukydis (Eds.), *Infant Crying: Theoretical and research perspectives* (pp. 263-277). New York, NY: Plenum Press.

Frodi, A., & Lamb, M. E. (1980). Child abusers' responses to infant smiles and cries. *Child Development*, 238-241.

Frodi, A., & Senchak, M. (1990). Verbal and behavioral responsiveness to the cries of atypical infants. *Child Development, 61*(1), 76-84.

Glocker, M. L., Langleben, D. D., Ruparel, K., Loughead, J. W., Valdez, J. N., Griffin, M. D., . . . Gur, R. C. (2009). Baby schema modulates the brain reward system in nulliparous women. *Proceedings of the National Academy of Sciences, 106*(22), 9115-9119.

Green, J. A., Jones, L. E., & Gustafson, G. E. (1987). Perception of cries by parents and nonparents: Relation to cry acoustics. *Developmental Psychology, 23*(3), 370.

Grossmann, K., Grossmann, K. E., Spangler, G., Suess, G., & Unzner, L. (1985). Maternal sensitivity and newborns' orientation responses as related to quality of attachment in northern Germany. *Monographs of the Society for Research in Child Development*, 233-256.

Halberstadt, A. G., & Lozada, F. T. (2011). Emotion development in infancy through the lens of culture. *Emotion Review, 3*(2), 158-168.

Haltigan, J. D., Leerkes, E. M., Burney, R. V., O'Brien, M., Supple, A. J., & Calkins, S. D. (2012). The infant crying questionnaire: Initial factor structure and validation. *Infant Behavior and Development, 35*(4), 876-883.

Harkness, S., & Super, C. M. (1983). The cultural construction of child development: A framework for the socialization of affect. *Ethos, 11*(4), 221-231.

Harwood, R. L. (1992). The influence of culturally derived values on Anglo and Puerto Rican mothers' perceptions of attachment behavior. *Child Development, 63*(4), 822-839.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2-3), 61-83.

Hewlett, B. S. (1991). *Intimate Fathers*. Ann Arbor: University of Michigan press.

Hewlett, B. S., Lamb, M. E., Leyendecker, B., & Schölmerich, A. (2000). Parental investment strategies among Aka foragers, Ngandu farmers, and Euro American urban-industrialists. In L. Cronk, N. Chagnon, & W. Irons (Eds.), *Adaptation and human behavior: An anthropological perspective* (pp. 155-178). New York: Walter de Gruyter, Inc.

Hiltunen, P., Moilanen, I., Szanjberg, N., & Gardner, N. (1999). The IFEEL Pictures: Transcultural aspects of importing a new method. *Nordic Journal of Psychiatry, 53*(3), 231-235.

Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M., & Lyons, T. (1991). Early vocabulary growth: Relation to language input and gender. *Developmental Psychology, 27*(2), 236.

Ivey, P. K. (2000). Cooperative reproduction in Ituri Forest Hunter-Gatherers: Who cares for Efe infants. *Current Anthropology, 41*(5), 856-866. doi 10.1086/317414.

Izard, C. E. (1994). Innate and universal facial expressions: evidence from developmental and cross-cultural research. *Psychological Bulletin, 115*(2), 288-299.

Joosen, K. J., Mesman, J., Bakermans‐Kranenburg, M. J., Pieper, S., Zeskind, P. S., & van IJzendoorn, M. H. (2013). Physiological reactivity to infant crying and observed maternal sensitivity. *Infancy, 18*(3), 414-431.

Kamel, H., & Dockrell, J. (2000). Divergent perspectives, multiple meanings: A comparison of caregivers' and observers' interpretations of infant behaviour. *Journal of Reproductive and Infant Psychology, 18*(1), 41-60.

Keller, H. (2013). Attachment and Culture. *Journal of Cross-Cultural Psychology, 44*(2), 175-194. doi:10.1177/0022022112472253.

Keller, H., Kärtner, J., Borke, J., Yovsi, R., & Kleis, A. (2005). Parenting styles and the development of the categorical self: A longitudinal study on mirror self-recognition in Cameroonian Nso and German families. *International Journal of Behavioral Development, 29*(6), 496-504. doi:10.1080/01650250500147485.

Keller, H., & Otto, H. (2009). The cultural socialization of emotion regulation during infancy. *Journal of Cross-Cultural Psychology, 40*(6), 996-1011.

Keller, H., Voelker, S., & Yovsi, R. D. (2005). Conceptions of parenting in different cultural communities: The case of West African Nso and Northern German women. *Social Development, 14*(1), 158-180. doi:10.1111/j.1467-9507.2005.00295.x.

Krippl, M., Ast-Scheitenberger, S., Bovenschen, I., & Spangler, G. (2010). Maternal perception of infants' expressions of emotion. *Journal of Psychophysiology, 24*(3), 173-185.

Lamb, M. E., & Lewis, C. (2013). Father-child relationships. In N. Cabrera & C. Tamis-LeMonda (Eds.), *Handbook of Father Involvement: Multidisciplinary Perspectives* (2nd ed., pp. 119-135). New York, NY: Routledge.

Leerkes, E. M., & Crockenberg, S. C. (2006). Antecedents of mothers' emotional and cognitive responses to infant distress: The role of family, mother, and infant characteristics. *Infant Mental Health Journal, 27*(4), 405-428.

Leerkes, E. M., Parade, S. H., & Burney, R. V. (2010). Origins of mothers' and fathers' beliefs about infant crying. *Journal of Applied Developmental Psychology, 31*(6), 467-474.

Leerkes, E. M., & Siepak, K. J. (2006). Attachment linked predictors of women's emotional and cognitive responses to infant distress. *Attachment & Human Development, 8*(01), 11-32.

Leerkes, E. M., Su, J., Calkins, S. D., Supple, A. J., & O'Brien, M. (2016). Pathways by which mothers' physiological arousal and regulation while caregiving predict sensitivity to infant distress. *Journal of Family Psychology, 30*(7), 769-779.

Leger, D. W., Thompson, R. A., Merritt, J. A., & Benz, J. J. (1996). Adult perception of emotion intensity in human infant cries: Effects of infant age and cry acoustics. *Child Development, 67*(6), 3238-3249.

Leyh, R., Heinisch, C., Behringer, J., Reiner, I., & Spangler, G. (2016). Maternal Attachment Representation and Neurophysiological Processing during the Perception of Infants' Emotional Expressions. *PLoS ONE, 11*(2), e0147294.

Lin, H., Manuel, J., McFatter, R., & Cech, C. (2016). Changes in empathy-related cry responding as a function of time: A time course study of adult's responses to infant crying. *Infant Behavior & Development, 42*, 45-59.

Lindová, J., Špinka, M., & Nováková, L. (2015). Decoding of baby calls: can adult humans identify the eliciting situation from emotional vocalizations of preverbal infants? *PLoS ONE, 10*(4), e0124317.

Lorenz, K. (1971). *Studies in animal and human behaviors* (Vol. 2). London: Methuen.

Lutz, C., & White, G. M. (1986). The anthropology of emotions. *Annual Review of Anthropology, 15*, 405-436.

Messinger, D. S., Cassel, T. D., Acosta, S. I., Ambadar, Z., & Cohn, J. F. (2008). Infant smiling dynamics and perceived positive emotion. *Journal of Nonverbal Behavior, 32*(3), 133.

Miyake, K., Chen, S. J., & Campos, J. J. (1985). Infant Temperament, Mothers Mode of Interaction, and Attachment in Japan - an Interim-Report. *Monographs of the Society for Research in Child Development, 50*(1-2), 276-297. doi:10.2307/3333838

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Journal of Clinical Epidemiology, 62*, 1006-1012.

Nitschke, J. B., Nelson, E. E., Rusch, B. D., Fox, A. S., Oakes, T. R., & Davidson, R. J. (2004). Orbitofrontal cortex tracks positive mood in mothers viewing pictures of their newborn infants. *Neuroimage, 21*(2), 583-592.

Odden, H. L. (2009). Interactions of temperament and culture: the organization of diversity in Samoan infancy. *Ethos, 37*(2), 161-180.

Otto, H., & Keller, H. (Eds.). (2014). *Different face of attachment - Cultural variations on a universal human need*. Cambridge: Cambridge University Press.

Papoušek, M. (1989). Determinants of responsiveness to infant vocal expression of emotional state. *Infant Behavior and Development, 12*(4), 507-524.

Parker, A. E., Halberstadt, A. G., Dunsmore, J. C., Townley, G., Bryant, A., Thompson, J. A., & Beale, K. S. (2012). *I. Introduction. Monographs of the Society for Research in Child Development*.

Phelps, J. L., Belsky, J., & Crnic, K. (1998). Earned security, daily stress, and parenting: A comparison of five alternative models. *Development and Psychopathology, 10*(01), 21-38.

Plant, E. A., Hyde, J. S., Keltner, D., & Devine, P. G. (2000). The gender stereotyping of emotions. *Psychology of Women Quarterly, 24*(1), 81-92.

Porges, S. W. (2007). The polyvagal perspective. *Biological psychology, 74*(2), 116-143.

Posada, G., Lu, T., Trumbell, J., Kaloustian, G., Trudel, M., Plata, S. J., . . . Lay, K. L. (2013). Is the Secure Base Phenomenon Evident Here, There, and Anywhere? A Cross-Cultural Study of Child Behavior and Experts' Definitions. *Child Development, 84*(6), 1896-1905. doi:Doi 10.1111/Cdev.12084

Quinn, N., & Mageo, J. M. (2013). *Attachment reconsidered: Cultural perspectives on a Western theory*. New York: Palgrave Macmillan.

Rothbaum, F., & Morelli, G. (2005). Attachment and culture: Bridging relativism and universalism. In W. Friedlmeier, P. Chakkarath, & B. Schwarz (Eds.), *Culture and human development: The importance of cross-cultural research to the social sciences* (pp. 99-123). New York, NY: Psychology Press.

Röttger‐Rössler, B., Scheidecker, G., Funk, L., & Holodynski, M. (2015). Learning (by) Feeling: A Cross‐Cultural Comparison of the Socialization and Development of Emotions. *Ethos, 43*(2), 187-220.

Savitz, J. B., & Drevets, W. C. (2009). Imaging phenotypes of major depressive disorder: genetic correlates. *Neuroscience, 164*(1), 300-330.

Smith, V., Devane, D., Begley, C. M., & Clarke, M. (2011). Methodology in conducting a systematic review of systematic reviews of healthcare interventions. *BMC Medical Research Methodology, 11*(15), 1-6.

Soltis, J. (2004). The signal functions of early infant crying. *Behavioral and Brain Sciences, 27*(04), 443-458.

Spangler, G., Geserick, B., & von Wahlert, A. (2005). Parental perception and interpretation of infant emotions: Psychological and physiological processes. *Infant and Child Development, 14*(4), 345-363.

Spangler, G., Maier, U., Geserick, B., & von Wahlert, A. (2010). The influence of attachment representation on parental perception and interpretation of infant emotions: A multilevel approach. *Developmental Psychobiology, 52*(5), 411.

Stern, R. M., Ray, W. J., & Quigley, K. S. (2001). *Psychophysiological recording* (2nd ed.). New York, NY: Oxford University Press.

Suizzo, M. A. (2004). Mother–child relationships in France: Balancing autonomy and affiliation in everyday interactions. *Ethos, 32*(3), 293-323.

Super, C. M., & Harkness, S. (1986). The developmental niche: A conceptualization at the interface of child and culture. *International Journal of Behavioral Development, 9*(4), 545-569.

Taumoepeau, M., & Ruffman, T. (2006). Mother and infant talk about mental states relates to desire language and emotion understanding. *Child Development, 77*(2), 465-481.

van Ijzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: a meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological Bulletin, 117*(3), 387.

van Ijzendoorn, M. H., & Kroonenberg, P. M. (1988). Cross-cultural patterns of attachment: A meta-analysis of the strange situation. *Child Development*, 147-156.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman Eds.). United States of America: President and Fellows of Harvard College.

Weisner, T. S., Gallimore, R., Bacon, M. K., Barry III, H., Bell, C., Novaes, S. C., . . . Nerlove, S. B. (1977). My brother's keeper: Child and sibling caretaking. *Current Anthropology*, 169-190.

Zahn-Waxler, C., & Radke-Yarrow, M. (1990). The origins of empathic concern. *Motivation and Emotion, 14*(2), 107-130.

Zeifman, D. M. (2003). Predicting adult responses to infant distress: Adult characteristics associated with perceptions, emotional reactions, and timing of intervention. *Infant Mental Health Journal, 24*(6), 597-612.

Zeskind, P. S., & Lester, B. M. (1978). Acoustic features and auditory perceptions of the cries of newborns with prenatal and perinatal complications. *Child Development*, 580-589.

Appendix

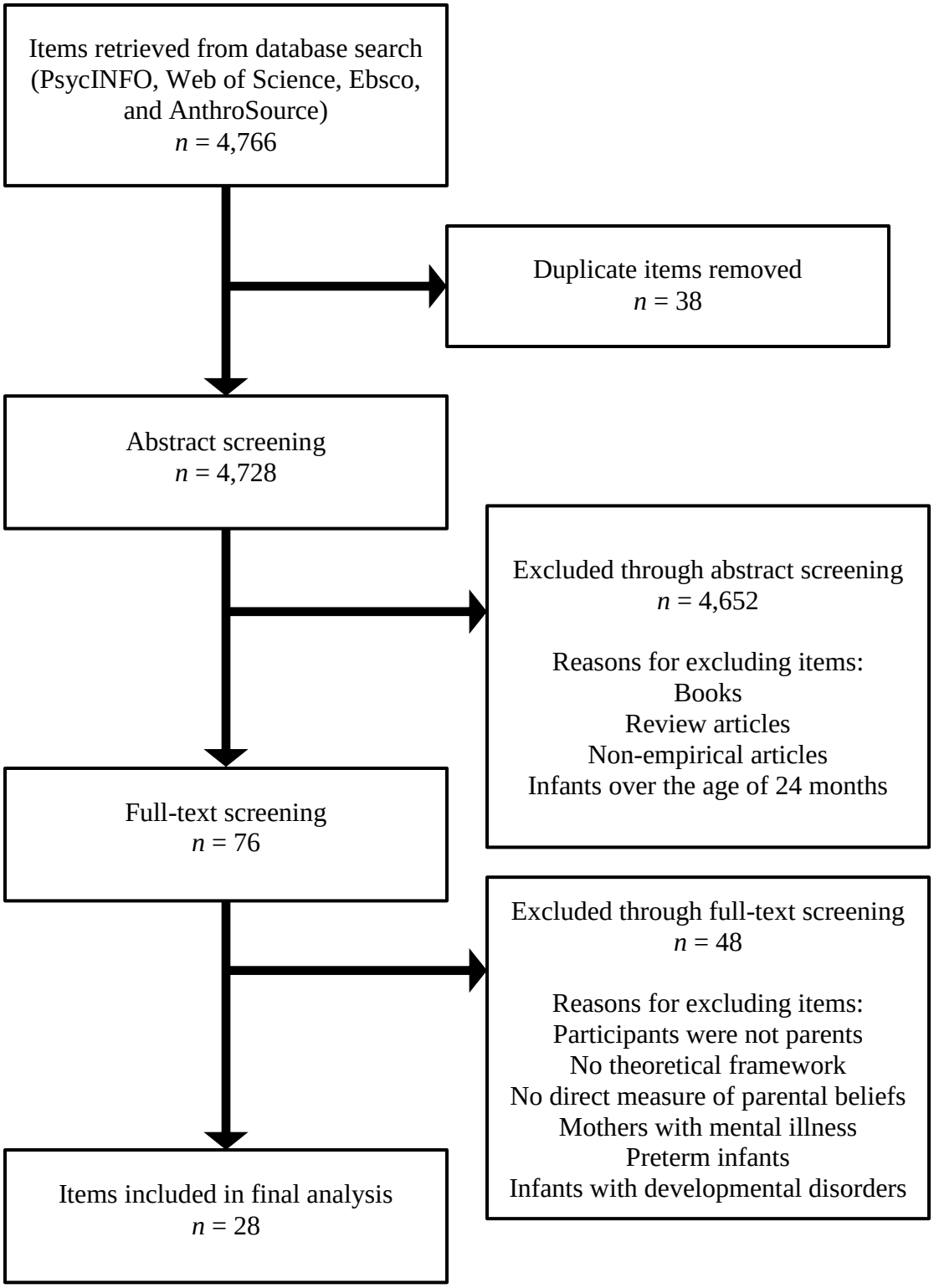

Figure 2.1 Flowchart for included studies

Table 2.1 Articles included in systematic literature review

Author	Country	Participants	Race/Ethnicity	Fathers	Area of Findings
Barrett et al. (2012)	Canada	22 mothers	NR	No	Neurophysiological
Dayton et al. (2016)	U.S.	120 mothers	47 AA 36 EA 12 Biracial 5 Other	No	Parental factors (i.e., psychosocial stressors, early life experiences) associated with perceptions
DeOliveira (2001)	Canada	100 mothers	81 EA 5 Middle Eastern 7 Latin American 1 Caribbean 1 Asian	No	Attachment
Fouts et al. (2012)	Central Africa	100 mothers	40 Aka foragers 41 Ngandu farmers 14 Bofi foragers 5 Bofi farmers	Yes	Cultural
Green et al. (1987)	U.S.	24 nonparents (college students); 10 parents (couples)	NR	Yes	Effects of parental experience on perceptions
Haltigan et al. (2012)	U.S.	259 mothers	138 EA 131 AA	No	Attachment
Hiltunen et al. (1999)	Finland	42 Finish mothers 103 Croatian mothers 145 American mothers	NR	No	Cultural

Table 2.1 (*Continued*)

Author	Country	Participants	Race/Ethnicity	Fathers	Area of Findings
Kamel & Dockrell (2000)	UK	44 college students (males and females), 6 were parents; 14 mother-infant dyads	NR	NR	Effects of parental experience on perceptions
Krippl et al. (2010)	Germany	69 mothers	NR	No	Neurophysiological
Leerkes & Crockenberg (2006)	U.S.	67 mothers	NR	No	Parental factors (i.e., psychosocial stressors, early life experiences) associated with perceptions
Leerkes et al. (2010)	U.S.	87 parents (couples)	85%, 81% White mothers, fathers 12%, 15% Black mothers, fathers 2% AS 1% Hispanic 5% of fathers did not disclose	Yes	Parental factors (i.e., psychosocial stressors, early life experiences) associated with perceptions
Leerkes & Siepak (2006)	U.S.	440 female college students, 33 were mothers	327 EA 113 AA	No	Attachment
Leerkes et al. (2016)	U.S.	259 mothers	128 EA 123 AA 8 Multiracial	No	Neurophysiological

Table 2.1 (*Continued*)

Author	Country	Participants	Race/Ethnicity	Fathers	Area of Findings
Leger et al. (1996)	U.S.	30 college students, 18 female, 12 male, (some parents); 30 parents (16 mothers 14 fathers)	Predominantly White	NR	Effects of parental experience on perceptions
Leyh et al. (2016)	Germany	32 mothers	NR	No	Neurophysiological
Lin et al. (2016)	U.S.	135 college students, 108 females, 27 males, 22 were parents	NR	NR	Parental factors (i.e., psychosocial stressors, early life experiences) associated with perceptions
Lindová et al. (2015)	Czech	135 females, 44 males, 106 were parents	NR	NR	Effects of parental experience on perceptions

Table 2.1 (*Continued*)

Author	Country	Participants	Race/Ethnicity	Fathers	Area of Findings
Messinger et al. (2008)	U.S.	191 college students, 71% female; 32 mothers, 5 fathers	55% White students 20.9% Hispanic students 12.6% AA students 3.1% Asian students 8.4% Bi-racial/Other students 45.9% White parents 45.9% Hispanic parents 2.7% AA parents 2.7 Asian 2.7% Bi-racial/Other parents	Yes	Effects of parental experience on perceptions
Odden (2009)	Samoa	10 caregivers	Somoan	NR	Cultural
Papoušek (1989)	Germany	20 parents (couples); 37 mothers; 29 nonparents	NR	Yes	Effects of parental experience on perceptions
Plant et al. (2000)	U.S.	34 expectant mothers; 34 expectant fathers	97% White 3% AS	Yes	Cultural
Röttger-Rössler et al. (2015)	Taiwan	Caregivers	Tao Bara	NR	Cultural

Table 2.1 (*Continued*)

Author	Country	Participants	Race/Ethnicity	Fathers	Area of Findings
Spangler et al. (2005)	Germany	23 parents (couples)	NR	Yes	Neurophysiological
Spangler et al. (2010)	Germany	23 parents (couples)	NR	Yes	Neurophysiological
Suizzo (2004)	France	32 mothers	European Origin	No	Cultural
Taumoepeau & Ruffman (2006)	New Zealand	71 mothers	70 White infants	No	Cultural
Wikander & Theorell (1995)	Sweden	122 mothers	NR	No	Parental factors (i.e., psychosocial stressors, early life experiences) associated with perceptions
Zeifman (2003)	U.S.	188 parents, 138 were women, 50 were men	87% EA	Yes	Parental factors (i.e., psychosocial stressors, early life experiences) associated with perceptions

NR = Not Reported, AA = African American, EA = European American, AS = Asian American
AAI = Adult Attachment Interview
IFEEL = Infant Facial Expressions of Emotion from Looking at Pictures
IWM = Internal Working Model
RSA = Respiratory sinus arrhythmia (a measure of vagus nerve activity; decreases during stressful events; represent an individual's control of emotional arousal)
SCL = Skin conductance level (physiological measure of emotional arousal)

Chapter III

The Cultural Model of Infant Emotions and Needs among the Gamo People of Southern Ethiopia

Abstract

How mothers perceive their infants' emotions and their subsequent responses are influenced by cultural values and beliefs. Mothers that live in particularly harsh environments may have perceptions about their infants' emotions that reflect not only cultural values but also constraints of the environment in which the infant develops. In this qualitative study, 29 Gamo mothers living in rural Southern Ethiopia were interviewed about their perceptions of their infants' emotions, how they felt in response to these emotions and what they believed their infants needed in response to their emotional displays. Through constant comparative analysis and thematic coding in NVivo, several patterns emerged in mothers' perceptions about their infants' emotions and what constituted appropriate responses. Mothers said that their infants' negative emotional displays were possibly related to illness and that appropriate responses to infants' emotions were focused mostly on breastfeeding, complementary food, and needing to be held. Mothers also discussed their work demands and how they conflicted with their desire to respond to their infants; however, many mothers said that they relied on their older children to help care for their infants. Mothers' responses were centered on a parenting strategy aimed at promoting infant health and survival, which is consistent with research on parents living in rural environments that subsist by farming and have relatively high risk for infant mortality.

Introduction

Cultural models of parenting practices are influenced by many aspects of an infant's environment, including the physical and social environment as well as cultural values and customs shared by members of a society. Researchers have described cultural models of many aspects of parenting among various cultures (Fouts, Hewlett, et al., 2012; Hewlett, Lamb, et al., 2000b; Keller et al., 2006; Keller & Otto, 2009; Yovsi & Keller, 2003), but specific cultural models related to infant emotion have not been previously investigated and identified. Shared beliefs or interpretations of events or behaviors that are socially transmitted among a group of people with shared life experiences are encompassed within cultural models (Strauss & Quinn, 1997). For example, cultural models of particular aspects of parenting (i.e., breastfeeding, weaning, holding) contain parents' beliefs about what is best for infants within their environment of development (Fouts, Hewlett, et al., 2012; Hewlett, Lamb, et al., 2000b; Keller et al., 2006; Keller & Otto, 2009; Yovsi & Keller, 2003). The purpose of this study is to complement the existing literature on cultural models of parenting by identifying cultural models of infant emotion and needs among Gamo mothers in Southern Ethiopia and to connect these models with broader cultural models of parenting and foundational schema as well as aspects of Gamo infants' developmental niche (e.g., customs of childcare and social and physical environment) (Super & Harkness, 1986).

Cultural Models and Foundational Schema

Cultural models are important because they guide parents' thinking and knowledge about what is necessary and appropriate for children and stem from broader foundational schemas (i.e., core values and beliefs) within societies. Shore (1996) has posited that foundational schemas structure cultural models and the behaviors influenced by these cultural models and are the core

values shared by members of a society. Foundational schemas are deeply held core values, like egalitarianism, independence, autonomy, and gender and age hierarchy and are intertwined in and influence many facets of people's daily lives (Shore, 1996) including parenting behaviors. Foundational schema have been related to aspects of parenting like breastfeeding (Fouts, Hewlett, et al., 2012; Yovsi & Keller, 2003), infant carrying (Lozoff & Brittenham, 1979), and weaning (Fouts et al., 2005; Meehan & Roulette, 2013). Cultural models are organized under foundational schema and are related to one another through foundational schema (Shore, 1996). Furthermore, broader cultural models (e.g., of parenting or child development) encompass more specific *special-purpose* models (Shore, 1996), like cultural models of infant emotion and needs.

The Developmental Niche

The developmental niche is another theoretical framework for understanding how culture guides behavior. It organizes parenting beliefs and goals and highlights the influence of cultural customs and physical and social aspects of an infant's environment on infant development. The developmental niche combines anthropological and psychological theories of child development to understand how children develop throughout the lifespan and how culture structures this development (Super & Harkness, 1986). The developmental niche includes three subsystems that concurrently influence how a child develops within context: physical and social settings, customs of child care, and psychology of caretakers (Super & Harkness, 1986). Physical and social settings can include the nature of relationships between people within societies (e.g., sibling and allocaretaking) and aspects of the physical environment that structure a child's activities (e.g., school, a child's involvement in work or subsistence). Customs of childcare can include the nature of infant carrying, infant sleeping, and parents' encouragement of infant walking. Parental ethnotheories are subsumed under the third subsystem of the developmental

niche, psychology of the caretakers, and include parental beliefs about particular infant behaviors and how children should develop as well as how parents should respond to their infants (Super & Harkness, 1986). The subsystems of the developmental niche can be used as a framework to organize cultural models of infant emotion and needs and demonstrate the ways in which subsystems are intertwined and influence one another. Most importantly, the developmental niche highlights the effects of all aspects of the environment (i.e., physical and social) on the cultural beliefs or parental ethnotheories of child development. One goal of the current study is to explore the impact of parental ethnotheories of infant emotion on responses to infants as well as examine how foundational schema, physical and social aspects of the environment, and cultural customs relate to parental ethnotheories about infant emotion.

Hierarchy of Parenting Strategies

Parents' beliefs about their infants and their emotions relate to their childrearing goals. According to LeVine (1980), the environment in which a child develops impacts the goals of the parents for the child. In the harshest environments, parents' concern tends to focus on infant health and survival. If survival is assured, parents may invest in economic achievement and attempt to enhance a child's ability to accomplish cultural values (e.g., education and wealth) (LeVine, 1980). This framework can be applied to parental beliefs about infant emotion and help to understand what parents say about their infants' emotions. How parents view their infants' emotional displays may reflect larger parenting strategies that are influenced by environmental constraints (e.g., the likelihood of their infant surviving in the current environment), which is in line with LeVine's framework.

However, LeVine's (1980) adaptationist model that attributes variations in parental investment among farming and urban-industrial societies to infant mortality risk may be too

simplistic (Hewlett & Lamb, 2002; Hewlett, Lamb, et al., 2000b). Hewlett and colleagues (2000b) found that European American and Ngandu (agriculturalists) parents demonstrated some similar parenting behaviors (e.g., infant feeding), but Aka (foragers) parents, which share a similar risk of infant mortality to Ngandu farmers, oftentimes demonstrated parenting behaviors (e.g., infant feeding and holding) that were substantially different from both Ngandu and European American parents. Furthermore, Aka and Ngandu parents believed that crying would lead to illness, but Aka parents were more responsive to their infants' displays of distress (Hewlett & Lamb, 2002). Hewlett and Lamb (2002) suggested that cultural values and beliefs might contribute to these differences in responses to infants. The Ngandu value respect and deference towards others and may let infants cry for a longer period of time in order to help infants develop respect for the needs of others, whereas Aka value sharing and emotional closeness possibly leading to quick responses to infant fussing and crying (Hewlett & Lamb, 2002). This prompted Hewlett and Lamb (2002) to suggest that cultural models of parenting, which include parental ethnotheories, be included in explanations of parental investment in particular contexts.

Attachment Perspectives

Attachment theory has been used to predict different parenting strategies and behavioral outcomes for infants. One tenet of attachment theory posits that infant attachment evolved during the Environment of Evolutionary Adaptedness (EEA) in order to elicit infant-caregiver proximity through infant attachment behaviors like smiling, vocalizing, and crying (Bowlby, 1969). Keller (2013, 2014) has argued that attachment is a "universal human need" (pg. 2), but how this attachment relationship develops between infants and their caregivers looks different across various cultures and that these variations should be accommodated in attachment theory.

Van Ijzendoorn and Sagi-Shwartz (2008) while acknowledging variations in attachment relationships due to context, have concluded that the normativity hypothesis of attachment theory still stands (i.e., normativity in the behaviors of securely attached infants; securely attached infants demonstrate similar behaviors across cultures). Furthermore, in a cross-cultural meta-analysis of the distribution of attachment behaviors, van Ijzendoorn and Kroonenberg (1988) found more intracultural variation than intercultural variation further inciting support for the normativity hypothesis. However, the assumption of the importance of mother-infant secure attachment and the universality of the behaviors that make up that relationship continue to be applied to many contexts despite accounts of differences in mother-infant relationships across societies (Keller, 2013; Otto & Keller, 2014; Quinn & Mageo, 2013). In addition, attachment behaviors that represent "secure attachment" relationships (Bowlby, 1988) may not be seen in all contexts and may be displayed differently depending on the environment in which the infant develops. Consequently, the distribution of attachment behaviors first laid out by Ainsworth, Blehar, Waters, and Wall (1978) has not been replicated in all contexts (Miyake et al., 1985; Sagi et al., 1985). Miyake and colleagues (1985) and Sagi and colleagues (1985) both attributed the deviation in the proportion of infants in each attachment group to underexposure to strangers among their participants. Furthermore, Miyake and colleagues (1985) cited the strong mother-infant bond in the Japanese context as contributing to dissimilarities in the proportions of attachment groups. Miyake and colleagues (1985) hypothesized that the large number of Japanese infants in their sample classified as insecurely attached by the Strange Situation assessment (compared to the rates of insecurely attached infants outlined in Ainsworth, 1978) was due to the relative infrequency of mother-infant separation and an emphasis on mother-infant proximity.

Daily mother-infant interactions influence how infants will relate to other individuals outside of the mother-infant relationship (Draper & Belsky, 1990). These early interactions, whether they are characteristic of secure or insecure mother-infant interactions, help infants develop internal working models (IWMs) (Bowlby, 1969; Bretherton & Munholland, 2008) that predict future social interactions (Draper & Belsky, 1990). Thus, early insecure and secure attachment relationships may prepare children for different life course trajectories (e.g., mistrustful/trustful internal working models, early/delayed puberty) and reproductive strategies that are equally advantageous in reproductive outcomes (Belsky et al., 1991; Draper & Belsky, 1990; Hochberg & Belsky, 2013; Lamb, Thompson, Gardner, & Charnov, 1985; Lamb, Thompson, Gardner, Charnov, & Estes, 1984).

The assumption that infants require a secure base for development (Ainsworth, 1972; Bowlby, 1988; Keller, 2014; Sroufe & Waters, 1977), though, may be a universal consistent phenomenon of attachment theory. With a secure base, infants can more confidently explore their environments (Ainsworth, 1972; Sroufe & Waters, 1977) and develop internal working models through their secure base (Bretherton & Munholland, 2008). However, what infants learn through their secure base relationships may differ between contexts. Hewlett and colleagues (2000a) found that differences in early caregiver-infant interactions among the Aka foragers, Ngandu farmers, and Euro-Americans related to distinct cultural values and beliefs. For example, Aka infants were more likely to be held and responded to sensitively when fussing and crying, which Hewlett and colleagues (2000a) hypothesized led to the development of a trusting IWM and reflected the Aka cultural value of trustful and sharing relationships (Hewlett, Lamb, et al., 2000a).

Many of the tenets of attachment theory have been both supported and questioned (Keller, 2013; Otto & Keller, 2014; Quinn & Mageo, 2013; van Ijzendoorn & Kroonenberg, 1988; van Ijzendoorn & Sagi-Schwartz, 2008), but overwhelmingly, researchers have called for further consideration of cultural context in the development of infant attachment relationships (Keller, 2013; van Ijzendoorn & Sagi-Schwartz, 2008). Researchers acknowledge that attachment relationships have been shown to develop differently in different contexts (Gottlieb, 2004; Harwood, Miller, & Irizarry, 1995; Weisner et al., 1977), but the incorporation of these cross-cultural findings has yet to influence the tenets and hypotheses of attachment theory as well as the methodology (Otto & Keller, 2014).

Infant emotions and responses to those emotions are central to attachment theory, and this study will explore intracultural variation in cultural models of infant emotion and needs among one small-scale non-Western culture, the Gamo, and identify various beliefs about infant emotions and related cultural models. Understanding how cultural groups conceptualize infant emotions and caregivers' roles in those emotions (i.e., expectations and beliefs and responses) is fundamental for developing more cross-culturally informed theories or improving existing theories.

Objectives

The goal of this study is to identify cultural models of infant emotion and needs by asking Gamo mothers about their subjective experiences with infant emotion, including how they feel and why they respond to their infants in particular ways. Researchers have drawn on interviews and focus groups with parents to identify cultural models of parenting (Borke, Lamm, Eickhorst, & Keller, 2007; Keller, Voelker, et al., 2005), but specific cultural models about infant emotions have not been investigated. If cultural models guide other aspects of parenting, then parents'

beliefs and subsequent responses to infant emotion should also reflect cultural models. The goal of this study is to highlight the cultural models of infant emotion and needs (i.e., including beliefs about and responses to infant emotions) among the Gamo of Southern Ethiopia and examine how this aspect of parenting is connected to core foundational schema and aspects of the environment (e.g., physical and social) as well as parents' individual beliefs.

The current study draws on qualitative interviews and ethnographic field notes to examine Gamo mothers' beliefs about infant development including what children need for development and how and why mothers respond to certain infant emotions and behaviors. One-on-one interviews asking mothers how and why they respond to their infants' emotions (i.e., subjective or emic interpretations) complement already existing literature that provides cultural explanations to other aspects of the parent-infant relationship (i.e., holding, weaning, and breastfeeding) (Fouts et al., 2005; Fouts, Hewlett, et al., 2012; Hewlett, Lamb, et al., 2000b; Meehan & Roulette, 2013; Yovsi & Keller, 2003). This qualitative analysis of mothers' possible similarities and variations in subjective interpretations and responses to infant emotions provides a missing perspective on understanding the practices and goals of parents living in particular contexts. Furthermore, this study argues for the inclusion of cultural beliefs into already existing dominant frameworks of parenting and child development (i.e., attachment theory, environmental risk and parenting strategy models). In order to investigate the cultural models of infant emotion and needs among the Gamo and factors that contribute to variations in these cultural models, the following research questions are addressed:

1.) What are the different cultural models of infant emotion and needs among the Gamo?
2.) How do the models vary in terms of emphasis or focus and how do cultural models of infant emotion and needs (i.e., parental ethnotheories) connect with other aspects of the

developmental niche (i.e., customs of childcare, social and physical environment) and foundational schema (i.e., core cultural values)?

Methods

Ethnographic Context: Fieldwork in the Gamo Highlands of Southern Ethiopia

This study stemmed from data collected during fieldwork in a small village in the Gamo-Dorze highlands of Southern Ethiopia in 2015 and 2016. The Gamo primarily subsist through agriculture using simple plows and some cattle as well as hand plows, and live in the Gamo highlands of Southern Ethiopia. Men primarily plow the land while females plant seeds, carry cow manure to the fields for fertilizer and harvest the crops. The Gamo mainly subsist on potatoes, wheat, barley, and a variety of beans. Some families have apple trees and most families have access to enset, a food staple (root crop) that the Gamo rely on during *Balgo*, the rainy season that the Gamo consider a time of hunger (the dry season is called *Bonae* and was the time for harvesting many crops). Although the Gamo rely heavily on agricultural products for food and income, many Gamo men also weave for extra income and some women make goods like jewelry to sell in local markets. Furthermore, the Gamo are stratified into 2 predominate social classes, the marginalized minority known as the *Degala*, who unlike the *Mala* (the majority group), subsist through hide working and blacksmithing as well as farming. Gamo hideworkers (Degala) marry within their social class and hold low political and economic status in society (Arthur, 2008). They live in a designated area within the village known as *Godare* (means hyena in Gamo – the Gamo are particularly scared of hyenas) in which the Mala tend not to visit. When Degala arrive at a Mala home, they are not permitted to go past the *zona* (a small room at the entrance of the home). Degala are also not permitted to offer Mala food (a common practice for guests) if a Mala individual arrives at the home of a Degala. Degala also have very

little farmland and only use hand plows (no Degala in the surveyed village owned cattle for farming). According to a village census taken in 2016, around 2,000 residents (49% male, 51% female) live in the surveyed village that is a part of a system of villages within a larger region of the Gamo-Dorze highlands. Gamo society is patriarchal and hierarchically structured by age. Among the Gamo, inheritance of land is predominately patrilineal and settlement following marriage was patrilocal. Men are viewed as the dominant authorities and control the family economy. Women are predominantly in charge of household duties like cooking and cleaning and are the primary caregivers of their children. Gamo children are generally socialized to be obedient and respectful of their parents and other members of the community. Most Gamo are religious Christians and practice either Evangelical Protestant or Ethiopian Orthodox religion. Some Gamo maintain a few traditional spiritual beliefs; however, most local devout Christians perceived these beliefs as deviant.

Gamo mothers spend a large majority of the day carrying their infant children on their backs in wraps, especially if the infant is an only child and does not have an older sibling to carry them. Mothers carry their infants on their backs because it allows them to continue to work in the field or at home preparing food. Older siblings also spend a lot of time caring for infants when mothers are working in the field or around the house. Infant caregivers (mothers and siblings) respond to infant fussing and crying quickly and whoever is close by the infant and hears the infant is expected to respond. Gamo mothers also bedshare with their infants and sometimes mothers and infants sleep separately from fathers.

Participants

Participants consisted of 29 Gamo mothers with focal infants between the ages of 1 and 11 months (average of 5.8; 17 female, 12 male) with residential fathers. All mothers were

married and two mothers were in polygynous families in which their husband had one other wife. Four mothers were from the *Degala* social class and the remaining mothers were *Mala*. Mothers ranged from about 18 to 30 years of age (average of 25); however, Gamo mothers often seemed reluctant to reveal their ages and some were unsure of their exact ages. For 9 out of 29 mothers, the focal child was their first child but mothers in this sample had an average of 3 children, ranging from 1 to 8. Mothers also varied in years of formal education from no education to 11 years of education (average 4.6). Table 3.1 describes characteristics of the participating mothers and focal infants.

Procedures

Data collection included demographic interviews with mothers and fathers, qualitative field notes, and semi-structured interviews with mothers concerning beliefs about child development and customs of childcare. Mothers and fathers were provided with the details of the study and consented prior to the first interview. The Institutional Review Board at the University of Tennessee approved all research procedures prior to data collection.

Parenting interview. We conducted parenting interviews with Gamo mothers to gather information about raising children in the village and mothers' beliefs about what children and infants need to develop well. Interviews typically lasted between 30 and 45 minutes. During interviews, we asked mothers about their thoughts regarding their infants' emotions (i.e., crying, smiling, etc.) and what they believed to be the best response to their infants' emotional displays. Mothers' responses to interview questions were translated from Gamo to English with the help of a Gamo-speaking research assistant. Interviews were audio-recorded and transcribed from English. Parenting interviews with mothers provided information regarding ethnotheories of

infant development and emotion and allowed for the identification of mothers' focus (i.e., infant survival, educational and economic achievement, adherence to cultural customs, etc.).

Qualitative field notes. We took qualitative focal-infant field notes on 3 separate days that consisted of information regarding the physical and social settings of the infant, impressions of the context and the focal infant, caregiver engagement with the focal infant, and anything the caregiver seemed to be focusing most of their energy on (e.g., caregiver is talking to the focal infant; caregiver is working in the home, etc.), and lastly, notes on any methodological issues. We took field notes for 29 focal-infants between the ages of 4 weeks and 11 months whose mothers were interviewed. Field notes were based on 6 hours of observations per child (spread across 3 days) and were taken for 15-minutes at a time following a 45-minute observation. Oftentimes, informal conversations with parents occurred or we asked questions about particular parenting practices; we documented relevant conversations and answers to questions in field notes. We also recorded aspects of the infant's physical and social environment (e.g., who is caring for the infant while the mother is gone?). We used qualitative field notes to identify cultural customs and values of the Gamo. We also took broader ethnographic field notes, usually at the end of the day after completing home visits (interviews or observations) or in-between home visits. These notes included descriptions of situations, activities, and people encountered throughout the day (Pellegrini, 2013) and were helpful in identifying foundational schema and cultural values of the Gamo. The ethnographic field notes were also informed by visits to homes for coffee ceremonies and attendance at community events and gatherings.

Analysis

Coding of parenting interviews and field notes. After preliminary examination of parenting interviews with mothers, focal-infant field notes, and ethnographic field notes, we

conducted a constant comparative analysis through reiterative readings of interviews and field notes to identify preliminary codes in parenting beliefs and behaviors (Corbin & Strauss, 2008). We compared incidents of preliminary codes to identify similarities and differences in order to group particular codes into emerging descriptive concepts or themes (e.g., "sickness," "obedience," "respect") (Corbin & Strauss, 2008). Interviews and field notes were coded in NVivo 10 in order to identify frequencies of used codes. First, interviews and field notes were open coded to identify categories of information and from there, certain codes were identified as subthemes within larger themes; this allowed us to identify groups of codes that could be subsumed under "core" phenomena (Corbin & Strauss, 2008; Creswell, 2012). Through coding, categories subsumed under the "core" phenomenon are identified as causal conditions (i.e., factors that cause the phenomenon) and strategies (i.e., actions that are in response to the phenomenon) (Creswell, 2012). Core phenomena are foundational schemas that guide particular strategies within cultures. For example, in some cultures, siblings are expected to help care for their younger siblings at an early age and thus spend a large majority of the day with their infant siblings. Furthermore, in some cultures with robust age hierarchies, children are expected to defer to parents' requests and do not question demands made by parents or elders of the community. Core phenomena help to make sense of emerging themes, understand how they connect, and situate themes within cultural context.

In order to answer question 1, we coded interviews with mothers to identify cultural models of mothers' perceptions of infant emotion among the Gamo. Cultural models were identified through themes in mothers' shared beliefs about their infants' emotions. Question 2 was addressed by investigating the emphasis of mothers' beliefs about infant emotions and what beliefs about emotion were related to (e.g., food, health, mothers' work demands); coding of

mothers' interviews allowed for the identification of the frequency at which mothers focused on certain cultural models or beliefs about infant emotion. Mothers' interview responses were also compared to ethnographic information from field notes (i.e., triangulation of data sources) to identify connections between interviews and core values of Gamo culture, customs of childcare, and social and physical aspects of the environment.

Strategies for trustworthiness. Strategies to ensure the trustworthiness of the data included extended engagement in the field, triangulation, reliability, and identification of researcher bias (Creswell, 2012). Ethnographic fieldwork was completed over two, 11-week periods in 2015 and 2016 and consisted of formal data collection (i.e., focal-infant observations and interviews with mothers), living in the community, and attending various events within the community.

Data were triangulated through multiple types of data (i.e., interviews and field notes) to identify patterns in mothers' beliefs about their infants and responses to their infants. Furthermore, data were analyzed through the lenses of multiple disciplinary perspectives (i.e., psychology and anthropology) and multiple theoretical frameworks (i.e., developmental niche, hierarchy of parenting strategies, foundational schema and cultural models).

Subjectivity. The first author was responsible for collecting all of the data in the field. Prior to fieldwork in Ethiopia, the first author engaged in multiple bracketing interviews with the experienced co-author, who has almost two decades of experience with ethnographic fieldwork, in order to identify potential biases. Biases or prejudices in research can have an impact on approaches to fieldwork as well as interpretations of findings (Peshkin, 1988). During preparation for fieldwork, the first author also read articles about issues related to fieldwork from researchers who had done prior fieldwork (Fouts & Lamb, 2005a; Irwin, 2009; Weiner-Levy &

Popper-Giveon, 2010) and enrolled in several classes that provided further information for how to identify one's own cultural lens. The classes helped the first author become more aware of her cultural lens, which is related to her American middle-class upbringing. Being a white American female certainly affected how participants viewed the first author and may have led some to perceive her as particularly privileged or powerful. The first author attempted to stay aware of her perceived status by being sensitive and aware of how people responded to her. Following ethnographic fieldwork standards, the first author embedded herself in the community and made herself available for interaction and observation by community members by living within the community. The first author also journaled in the field in order to process and bring awareness to any biases that arose and to bring awareness to instances of culture shock. The first author regularly accepted invitations from members of the community to coffee ceremonies and meals. The first author also learned the Gamo way of greeting members of the community and in particular, phrases for greetings and thanks. Prior to travelling to Ethiopia, the first author took weekly lessons in the Amharic language. Amharic is the national language of Ethiopia, and many Gamo (the language of the Gamo) phrases borrow words from Amharic and are often a combination of Gamo and Amharic words.

Results

Gamo mothers' responses to questions about their infants' emotions and their subsequent responses resulted in the identification of six major themes: 1) mothers' perceptions of infant distress (i.e., crying and fussing), 2) mothers' work, 3) identification of emotion, 4) needs of a distressed infant, 5) material resources make infants happy, and 6) emotional contagion. Subthemes also emerged within three of the major themes (themes 2, 4, & 6) that further characterized the major theme.

Mothers' Perceptions of Infant Distress

Mothers believed that infant crying was often the result of physical illness and some mothers expressed that their infants were possibly cursed with *gormate* ("evil eye"). During one observation, community members were observed praying over an uncontrollably crying infant with a bible. They believed that the young boy had been cursed with *gormate*. During another observation, community members were observed forcing an uncontrollably crying infant to drink a mixture of herbs and water to stop the crying. The Gamo are fearful of young children being overtaken with *gormate*. For example, infants are never observed without clothing and are quickly clothed after being bathed due to the fear that *gormate* has a greater chance of entering a naked baby. Evil eye is known to influence other aspects of parenting like breastfeeding in other countries as well (Wanjohi et al., 2017). Gamo babies are also often observed wearing beaded necklaces and bracelets to ward off *gormate*. In general, mothers' perceptions of why infants display distress were more apparent in ethnographic and focal-infant observations but were rarely directly described by mothers during interviews.

Gamo caregivers were observed to respond relatively quickly to infant distress with breastfeeding suggesting that displays of infant distress may not be tolerated. Similarly among the Nso agriculturalists (Cameroon), Keller and Otto (2009) found that crying and expression of negative emotion was met with immediate and even anticipatory breastfeeding, arguing that expression of negative emotion possibly signaled sickness whereas an infant that did not cry displayed health.

Crying infants appeared to make the Gamo uncomfortable, especially mothers. During the first author's subsequent fieldwork trip to the village the following summer, mothers were observed to be very uncomfortable during anthropometric measurements of their young children.

Many mothers knew that prior to taking weight and height measurements of their children that their children would fuss and cry. One mother was even observed walking behind her home so as not to see her young child cry once we displayed the anthropometric devices (i.e., scale).

The themes that emerged in interviews with mothers about infants' emotions focused on mothers' needs as well as the needs of their distressed infants. Mothers were less likely to explain why infants might be distressed, but all mothers were able to explain what they would do for their distressed infants to calm them. Furthermore, both positive and negative displays of emotion were met with similar responses (e.g., breastfeeding) by mothers, and many mothers expressed their desire to be able to provide material resources for their infants to make their infants content and happy.

Mothers' Work: The Competing Demands of Mothers

The conflicts between mothers' work demands and responsiveness towards their infants emerged as a major theme throughout interviews with mothers. Gamo women are heavily involved in agricultural work and this does not slow after having a baby. Postpartum women stayed at home with their newborn infants for the first 3-4 weeks but then continued work carrying manure to their fields and planting and harvesting crops. Women were also responsible for much of the cooking and childcare and oftentimes mothers' responsibilities conflicted with the emotional needs of their infants. Two subthemes emerged when women discussed their work and raising young children.

Mothers' inability to respond to their infants when working. About half of mothers discussed their work demands in relationship to the needs of their infants. One mother commented on the conflict between her daughter's cries and her desire to work. Another mother

commented on how her work interfered with her ability to get food herself and that this indirectly impacted her daughter:

> "Sometimes I leave him by working even if I hear him crying I leave him there."
>
> "She is crying a lot and it makes me very sad and stressed. I am begging God to give her more strength to sit and play by herself. That will make me a little bit free to work on other things. I'm also feeling sad when I see other kids that are the same age here as her and they are sitting, but my baby is still not."
>
> "She is not getting much food because of her appetite. She cries when she is very hungry because of that. Since I am working outside in the field, there is not as much more time to prepare food for myself and because of that, my breast is not giving enough milk for her."

Mothers discussed the two competing demands of work and caregiving by sometimes ignoring the emotional signals of their infants or by praying to God for help. Even though Gamo mothers worked throughout the day, many mothers mentioned that they would return home from their fields multiple times a day to breastfeed their infants. Some mothers were observed carrying their infants on their backs while collecting their farming products in their fields; however, much of a woman's workload required carrying manure to their fields for fertilizer and carrying the products from their fields on their backs to their homes. Thus, not all work performed by women allowed them to carry their infants on their backs while they worked. Mothers' distress over their inability to work if the needs of their infants were high suggests that mothers possibly preferred calm and content infants. This preference is further demonstrated in other themes (e.g., mothers are stressed if their infants are distressed and material objects are necessary to make infants content and happy).

The importance of sibling caretaking. Sibling caretakers were often essential to a mother's ability to work outside and within the home. For mothers that only had one child (the focal child), the absence of a sibling caretaker and the consequences on their ability to work was apparent in interview responses:

> "If he is more happy and playing, I make him sit and tell the other daughters to keep him and I go to my workplace."
>
> "If I go somewhere to work, she is spending time with her sisters and brothers."
>
> "If I go get wood or grass for cattle, she is taking care of her by giving the barley liquid. Also cleaning and carrying her."

Mothers described how sibling caretakers provided the majority of infants' needs, which included food, holding the infant, and playing with the infant. Sibling caretaking is a predominate practice among the Gamo and older siblings are required to care for infants. Children deferred to their parents when asked to take care of their infant siblings. Sibling caretaking also provides opportunities to gain parenting skills.

Identification of Emotion: "How can I know whether he is sad or not?"

Some mothers had difficulty with the interview question: How do you know your child is sad? Mothers explained that they did not know when their infants were sad and one mother even said that she did not think of her infant as sad. Many mothers responded by saying that regardless of the emotional display or signal, infants needed to be breastfed:

> "I don't know what kinds of feeling and emotions he has, but after I give him shower and breast, he sleeps."
>
> "I don't know what he needs, but I always give him the breast."

> "How can I know whether he is sad or not? If he is crying, I give him breast, but because he is not talking, how can I know if he is sad or not?"

Mothers' beliefs that they cannot interpret the emotional feelings of their infants and more so the feelings of infants other than their own did not prevent mothers from stating what they believed to be the best response to their infants' emotions, especially agitation: breastfeeding, additional food, and holding. Gamo mothers did not seem particularly concerned with how infants feel when they are distressed, but mothers were sure of what the best responses to their infants should be in order to calm their infants. Gamo mothers' beliefs that breastfeeding and proximal care (i.e., holding) were the best responses to infant distress reflect Gamo mothers' desire for calm and content infants possibly so that mothers can continue their work. Furthermore, mothers believed that this type of response to infant distress would stop continued fussing and crying and possibly prevent others in the community from suspecting that the infant was in poor health or cursed with evil eye.

Needs of a Distressed Infant: Feeding and Holding Make Infants Happy and Stop Infants from Crying

Mothers overwhelmingly said that the best way to respond to a fussy, crying, and distressed infant was through feeding and holding the infant and that most of the time these responses made the infant happy. Some mothers also discussed that additional food would most likely make their infants happy but that because of a lack of money, additional food was not always possible.

Breastfeeding. Beliefs about infant emotion appeared to be centered on breastfeeding. Every mother interviewed except one discussed breastfeeding as an effective response to negative infant emotion and that breastfeeding caused infants to become happy. Some mothers even said happy infants needed breastfeeding as well:

"Most of the time after breastfeeding, she becomes very happy, but before that, she is crying."

"I give her the breast. Breastfeeding is the best thing."

"Sometimes if he misses my breast, he becomes angry – that is the behavior he shows me sometimes."

"Even if she is playing and happy, I give her my breast and feed her."

Breastfeeding in response to any infant emotion was described predominantly as a way to keep infants happy and quickly make an infant happy if distressed. Mothers were not the only individuals observed breastfeeding distressed infants, grandmothers as well as adult female neighbors were often observed breastfeeding if the mother was not around to calm the infant. The observation of allonursing further suggested that calm and content infants were preferred among the Gamo.

Complementary feeding. The majority of mothers responded to their infants' negative emotions by providing additional food to their infant, especially among older infants:

"Maybe when he becomes 6 months or more, I will make him to eat and drink some additional foods. That will make him more happy"

"Maybe she needs better [cow's] milk and egg also. We try to feed her these things regularly, but because the economic problem, we can't do it regularly."

"I give her additional food which is made from the barley powder because the nurse told us to give additional food after 6 months."

Mothers were very aware that at the age of 6 months, infants needed complementary food and some mothers said that this additional food would be necessary to keep their infants happy. Mothers with younger infants even discussed that breastfeeding was the best way to calm an

infant but that additional food would be necessary when the infant got older (age 6 months). Gamo mothers believed that complementary food was necessary for infant health and development and many mothers expressed concern over their inability to provide this food for their infants. One mother even commented that her child was smaller than she should be because they could not provide her with the food that she likes to eat. These responses suggested that child health and survival are major concerns among the Gamo and reflected the goals of parents living in environments with high environmental risk.

Holding. Many mothers discussed holding their infants when they displayed a variety of emotions. Mothers also said that holding their infants kept them from crying and being sad:

> "Since I carry most of the time, I do not think he is very sad"
>
> "When he starts smiling and laughing, I hold him and am smiling and laughing with him."
>
> "Most of the time when he cries, I give him breast and carry him."
>
> "If I keep him on the ground, he starts crying, and if I carry him, he stops crying."

The majority of mothers discussed the need to hold their infants especially if the infant was distressed. Mothers of some of the youngest infants described how they needed to be held throughout the entire day. If mothers carried infants for an extended period of time, they were carried on the mother's back in a wrap, which allowed mothers to continue to work while keeping their infants calm.

Material Resources Make Infants Happy

About half of Gamo mothers expressed the desire for their infants to have play materials and that these items were important for infant happiness. Many mothers also said that they knew

that play things would make their infants even happier but that they could not afford to buy these items for their children:

> "Maybe she misses something that makes her happy, that is why I give her the play things."
>
> "We couldn't fulfill some things she needed that makes her more happy like playing material and shiny things also the baby rattle because those things can make the baby more happy."
>
> "Maybe she needs some other playing material – maybe those that make sound."

Providing infants with play objects were mostly discussed as a way to make content infants happy. One mother stated that if her infant was happy she didn't need anything, but if she had play materials, maybe she would be happier.

Emotional Contagion

The majority of mothers mentioned being stressed or angry in response to infant crying and that oftentimes if their infants were sad, they were sad as well; however, mothers also mirrored their infants' happiness.

Mothers are stressed or angry in response to infant emotion. The majority of mothers said that they were either stressed or angry or both at their inability to stop their infants' crying. Mothers said that they were often angry with themselves as well as angry with their infants:

> "Sometimes it makes me very stressed and sometimes it also makes me angry. Sometimes it makes me want to beat her."
>
> "When he is sad, most of the time he cries, and it makes me very angry."
>
> "It makes me very stressed, especially when she cries a lot and does not want to take my breast. It makes me also angry."

Mothers' stress in response to their infants' emotions was one of the more prevalent themes running through interviews with mothers. This stress likely stemmed from the conflict between infant care and work, as infant crying and mothers' desires to calm their infants impeded a mother's ability to work. One mother mentioned that her daughter cried a lot, more than other children her own age, and that this prevented her from being able to work. Some mothers responded that they would take their infants to traditional healers or to the health center if their infants cried a lot because they believed that something may be physically wrong with the infants. This supports that idea that fussing and crying demonstrated infant vulnerability to physical illness or the evil eye curse. Within Gamo culture, individuals believed to be cursed with evil eye are often ostracized from the rest of the community, so an infant's display of excessive crying and fussing could have suggested to others within the community that the infant had been cursed with the evil eye which could have detrimental effects on the infant.

Mothers express their infants' happiness and sadness. Many mothers also expressed feeling sad when their infants appeared sad but also happy if their infant appeared content or happy.

> "It makes me very happy since he is playing and laughing because of his happiness, that also makes me very happy."
>
> "It makes me very sad – like I am burning inside."
>
> "Most of the time if I am here, he is not crying because I give him breastfeeding when she wakes, but sometimes if I hear his crying, since I am his mother, it makes me very sad."

Emotional contagion was a prominent theme throughout interviews with mothers and could be related to the idea that a happy infant allowed a mother to work or that a sad infant may be sick

and needed to be taken to the health center or a traditional healer. Mothers expressed both scenarios.

Discussion

Cultural Models of Infant Emotion and Needs and Gamo Foundational Schema

Cultural models of infant emotion and needs appear tied to the social and physical environment in which Gamo infants live. Environmental pressures lead to strategies in child rearing that become cultural custom (LeVine, 1977). For example, mothers discussed concern over their desire and need to work and how this desire and need conflicted with their role as primary caregiver to their young children in the theme *Mothers' Work: The Competing Demands of Mothers*. Gamo mothers work in the fields to provide food for their families and are essential to their families' survival. Even though some mothers were observed working in their fields while carrying their infants on their backs in wraps, the majority of infants were observed at home with sibling caretakers while their mothers completed subsistence work. When infants cried or fussed, Gamo mothers often expressed their dissatisfaction of this emotional display through their verbal response to their infants. Mothers often sternly say "awa!?" ("what!?") to their infants when they have a negative emotional display and in a tone that seemed to imply their desire for the infant to stop crying and fussing. Keller and Otto (2009) described similar verbal discontent of infant fussing and crying among working Nso mothers. A calm Nso infant is preferred because it allows for mothers to complete their work (Keller & Otto, 2009). Furthermore, in a cross-cultural comparison between Nso and U.S. mothers, U.S. mothers said that they responded to crying infants with breastfeeding because they thought their infants were hungry, whereas Nso mothers anticipatorily breastfed their infants to keep them calm (Keller & Otto, 2009).

Relatively quick responsiveness to negative infant emotionality may also reflect the emotion socialization goals of Gamo mothers. Quick responses to negative infant emotion and less emphasis on positive emotionality could reflect the desire to impart interdependence and a sense of communality (Keller et al., 2004) among Gamo infants. Sidama (Ethiopia; agro-pastoralists) infants were observed to display less positive emotionality compared to U.S. infants (Gartstein, Bogale, & Meehan, 2016) which is consistent with what we observed among Gamo infants. Furthermore, positive emotionality towards infants is often expressed less among mothers in non-Western contexts (Whiting & Edwards, 1988).

Responsiveness to negative infant emotionality appears to be the responsibility of many individuals that are a part of an infant's development niche. Siblings are especially important and mothers often rely on siblings to care for infants so mothers can continue to work. This reliance on sibling caretaking was prominent among the Gamo and is a characteristic of many "production-enhancing" societies throughout the world (Blurton Jones, 2002; LeVine, 1977; Weisner et al., 1977). Blurton Jones (2002), in his seminal chapter on parental behavior and reproductive strategies, described Hadza foragers (Tanzania) as possessing parenting strategies and behaviors characteristic of production-enhancers. Similar to the production-enhancing strategy that Blurton Jones describes, Gamo women tend to have many children (e.g., an interbirth interval of around 2 years) and engage children in work including sibling caretaking; these are common practices among agricultural populations throughout Sub-Saharan Africa (Blurton Jones, 2002; LeVine, 1977).

Gamo mothers spend many hours in the field planting and collecting food, so mothers, especially those without older children, have competing demands for their time – caring for their infant and working. Mothers often expressed that they were stressed in response to their infants'

emotions most likely because of their inability to calm their infants meant that more time had to be spent with their infant instead of working in the fields. This was expressed in the subtheme *mothers are stressed or angry in response to infant emotion*. This theme also supports the desire of mothers to work in their fields to provide for their families and an infant that cries and is unhappy prevents a mother from working, especially among mothers without older children.

Gamo mothers also displayed maternal parenting behaviors that reflect a production-enhancing strategy (Blurton Jones, 2002) reminiscent of other Sub-Saharan agricultural societies, which includes frequent breastfeeding in infancy, breaking off suckling bouts in order to return to work, and occasionally ignoring the cries of their infants as well as calling for another child to respond to the infant (Draper & Harpending, 1987; Fouts, 2010; Fouts, Hewlett, et al., 2012; Hewlett, Lamb, et al., 2000b; Weisner et al., 1977). For example, within the theme *mothers' inability to respond to their infants when working*, some mothers mentioned that they heard their infants cry but that they continued to work anyway. Older siblings who may be too young to help the mother or father in the field are often told to take care of their younger infant sibling and parents sometimes use physical punishment when children do not obey the commands of their parents. Obedience, deference to authority, and compliance to parents' demands are parts of the foundational schema of Gamo culture and are strongly intertwined in the age and gender hierarchies of Gamo culture. Similar foundational schema are common among other agricultural societies in Sub-Saharan Africa (Blurton Jones, 2002; Fouts et al., 2005; Fouts & Lamb, 2009; Keller & Otto, 2009; LeVine, Dixon, LeVine, Richman, Keefer, et al., 1996; Yovsi & Keller, 2003).

Furthermore, what parents desire for their children varies between societies and parents in Western societies tend to discuss affection, love, and enjoyment when talking about their

relationships with their children (LeVine, 1977), whereas societies living in harsh environments like the Gamo tend to focus on the health and welfare of their infants. Mothers are mostly concerned with the physical health and needs than with the positive emotional responsiveness of their infants (LeVine, 1977). Gamo mothers did discuss the happiness and sadness of their infants, but this was in relationship to feeding, holding, and material resources like objects/playing materials.

Mothers' focus on the physical survival of their infants is the primary goal of parenting according to LeVine (1980), and if infants live in an environment where their health may be in jeopardy, parents' beliefs (a construct of the developmental niche) about what children need are focused on keeping their children alive. The focus on Gamo infants' physical needs is evident in the theme *Identification of Emotion: "How can I know whether he is sad or not?"* because mothers say that although they are not sure of what emotions their infants show, they know that they should breastfeed. Gamo mothers know that regardless of how their infants feel, breastfeeding will calm distressed infants.

LeVine (1970) has suggested that sub-Saharan African agricultural societies share similar patterns of affective traits that include adaptive caregiving practices to ensure infant physical health and survival. Foundational schema like age and gender hierarchies and the importance of material trade in interpersonal relations contribute to mothers' views on infant emotions as signals for physical needs with little focus on infants' emotional needs (LeVine, 1977). Gamo mothers never discussed the need to show verbal or physical affection in response to their infants' emotional displays and like other parents from agricultural societies, engage in less face-to-face interaction, smiling with their infant, and in eye contact (Keller, Voelker, et al., 2005; LeVine, 1977). Kilbride and Kilbride (1983) describes this as "low positive affect" in the

mother-infant relationship which is consistent among many agricultural societies; however, variations in this pattern of behavior among agriculturalists have been found (Kilbride & Kilbride, 1983; LeVine, 1970; Super & Harkness, 1974).

Gamo mothers also discussed the importance of material objects for infant happiness. This is not surprising considering that Gamo own materials and conflict often arises over stealing. Fouts and Lamb (2009) found that conflict regarding objects was more frequent among Bofi farmer toddlers (Central Africa) compared to Bofi forager toddlers and suggested that sharing was less common among Bofi farmers and material resources were perceived as limited in farming foundational schema. Furthermore, Hewlett and colleagues (2000b) found that Ngandu farmers (Central African Republic) had a fearful perception of the environment and a limited view of environmental resources, which led to a defense of resources and thus, less sharing. Gamo mothers often mentioned that they were unable to buy objects for their infants to play with but that if their infants had these objects, they would be much happier. Material objects represent wealth among the Gamo; thus, happiness may be tied to having these objects, and mothers recognize this even among their young children.

Attachment and Emotional Contagion

Mothers not only expressed that they were sometimes stressed or angry in response to their infants' emotions but that they also mirrored their infants' happiness or sadness. Emotional contagion, the unconscious tendency to mimic facial expressions, body movements and vocalizations of another person, is a universal and well-known phenomenon (Hatfield, Carpenter, & Rapson, 2014; Malatesta & Izard, 1984; Preston & de Waal, 2002). The unconscious mimicking of others' emotional displays is thought to occur at the level of the autonomic nervous system and through the firing of mirror neurons (neurons that fire in one's own brain

when performing a particular action or when simply observing another performing the same action) (for overview see Hatfield et al., 2014). Darwin (1965) suggested that imitation of human emotion may be innate and universal, and Trevarthen (1979) believed that mothers' imitation of their infants' emotions may be unconscious but existed to promote mother-infant bonding (for review see Preston & de Waal, 2002). Furthermore, both mother and infant are affected by each other's affective state, and the mother's emotional affect in response to infant emotion may be particularly adaptive by inducing maternal response and stimulation (for review see Preston & de Waal, 2002). For example, infants with colic that display high levels of distress have been found to induce distress in their parents and thus, emotional contagion may promote unconditioned responses by parents to contingently respond to infants prior to distress (for review see Preston & de Waal, 2002). Gamo mothers were often observed holding their infants on their backs in a wrap and often this practice was initiated following infant distress but mothers continued to hold and carry infants in this way even after the infant had calmed.

Emotional contagion of chronic distress can also lead to a depressed feeling or a person may even ignore affective displays of distress (Zahn-Waxler, 2002). Thus, a crying infant can induce empathic concern in parents or avoidance and in some cases abuse (Zahn-Waxler, 2002). Similar to findings on emotional contagion research, Gamo mothers expressed an array of emotions in response to their infants' emotions including stress, anger, happiness, sadness, and sometimes avoidance or a lack of acknowledgement of their infants' emotions. Gamo mothers expressed that the stress caused by their infants' crying caused them to become angry and some mothers mentioned that they would ignore their infants' cries, but this appeared to be related to mothers' work demands. However, what may cause mothers to avoid their infants' emotions or respond with stress, anger, sadness, or happiness is unknown. Mothers may be inclined to avoid

responding to their infants if they know that a sibling is nearby to respond to the infant's needs. Gamo mothers can continue to work if they are not the only individual around capable of attending to the infant's needs as siblings are effective at calming a fussy infant.

According to Reddy (1991) symbolic knowledge is created through interpersonal interaction; thus, emotional contagion may also be part of the interpersonal context that helps socialize infants to appropriate emotion expression. According to Holodynski (2009), mirroring of infant emotion by caregivers leads to infants' expectations of future expression, feelings, and caregivers' action-regulating responses. Gamo mothers' anger and stress towards infants' negative emotion may signal to infants that these emotional displays are inappropriate. In accordance with Keller and colleagues (2004), mothers may be imparting that emotional displays of this type reflect a lack of interdependence and communality.

Emotions in infancy serve as an action-regulating function. Holodynski (2009), Tronick (1989) and Malatesta and Izard (1984) found that infant emotional expressions of sadness and anger lead to affective responses of sadness and anger in mothers; however, these negative displays by mothers were fleeting and often followed by a positive reaction. Among Gamo mothers, observed negative reaction to infant distress was rare even though mothers expressed that they could be angry in response to their infants' emotions. Mothers' mirroring of negative infant emotions has been found to be less frequent or ignored compared to positive emotion (C. E. Izard, 1979). Regardless of Gamo mothers' internal feelings, if Gamo mothers were present during infant distress, their intention and goal was to stop the infant from fussing or crying through stimulation, feeding, or holding.

Mothers' Beliefs about the Needs of Gamo Infants

Parents' perceptions of their infants' needs are influenced by cultural beliefs about infant behavior. For example, Haitian parents living in Montreal perceive infancy as a very vulnerable time period in a child's life and this leads to co-sleeping, quick responsiveness, and constant carrying (Pomerlau, Malacuit, & Sabatier, 1991). Japanese parents view infants as separate beings that need to be drawn into codependent relationships with others (Wolf, Lozoff, Latz, & Paludetto, 1996) and this leads to highly responsive and constant physical proximity between mothers and babies (Bornstein, Tal, & Tamis-LeMonda, 1991; Shwalb, Shwalb, & Shofi, 1996). Gamo mothers appeared to view their infants as vulnerable and suggested that their infants' sadness was maybe due to sickness or a physical issue. Beliefs about vulnerable infants most likely stem from the harshness of the Gamo environment (i.e., physical setting construct of the developmental niche). Many mothers commented on the lack of food for their infants, especially infants over 6 months that require food in addition to breastfeeding as well as warm clothes in the cold highlands climate. Gamo mothers also cosleep with their infants and when home, spend a large amount of time carrying their infants on their backs.

Limitations

This study had several limitations. Even though many mothers ascribed to the identified cultural models of infant emotion and needs, including more Degala mothers may have resulted in more variation in mothers' beliefs and responses to their infants' emotions. Another limitation of the study included the time of the year that data were collected. Both fieldwork trips occurred during the rainy season, so mothers' responses regarding infant development in the village may have varied had data been collected during the dry season because of changes in weather and mothers' workload at this time. We would expect cultural models of Gamo infant emotion to be

similar however, but mothers' emphasis on what infants' need like particular foods may have been different because the dry season is the time of harvesting and parents discussed having more food during this time. Furthermore, time constraints affected the first author's ability to interview fathers about their infants' emotions and how they felt in response to those emotions. During the rainy season (the time when interviews were collected), fathers spend the majority of the day away from home plowing their fields. It was very difficult to schedule fathers for interviews, and we had hoped to include fathers in this study; however, demographic information was collected from infant's fathers. When fathers were observed at home with their children, they were often nurturing and responsive to their infants' needs suggesting that fathers are important in Gamo infant care. Fathers may also have different feelings towards their infants' emotions because fathers are not responsible for breastfeeding, which was a predominant theme among Gamo mothers around conflicts with work and infant care and contributed to mothers' feelings of stress in response to their infant's distress.

Conclusion

We have characterized the cultural model of infant emotion and needs and have demonstrated that Gamo mothers' perceptions of their infants' emotions are inextricably linked to their needs. This seems to be adaptive in a harsh and unpredictable environment characterized by food insecurity and high infant mortality because Gamo mothers believe that infants' emotional displays are a signal for need (e.g., holding, breastfeeding, complementary foods, etc.). The emotional contagion of infants' emotions could be an internal indicator that mothers rely on to assess their infants' health. Gamo mothers' parenting strategy is to help their infants survive and mothers rely on sibling caretakers to help fulfill this goal. Furthermore, it is not surprising that mothers expressed that they were stressed at the sound of their infants' distress if

fussing and crying is considered a sign of illness. Infant illness threatens mothers' parenting goal of infant survival.

The identification of the Gamo cultural model of infant emotions and needs helps provide an understanding of infant care practices among the Gamo and situates these practices within cultural context. Gamo infant care practices are focused on helping infants survive into childhood and infant emotions are signals for mothers to respond with the practices that mothers believe keep their infants alive. This qualitative study demonstrates that infant care practices can be understood more deeply through cultural models. In our study, the Gamo cultural model of infant emotion was linked to infant care; however, this could be different in other cultures and environments. The physical and social environment appears to be influenced by the Gamo cultural models of infant emotion and needs and investigations of cultural models of infant emotion and needs in other contexts would help to provide understanding about the extent to which aspects of the Gamo model relate to universal notions of infant emotions and what are unique to their culture and environmental context.

References

Ainsworth, M. D. (1972). Attachment and dependency: A developmental perspective. In J. L. Gewirtz (Ed.), *Attachment and dependency* (pp. 97-137). Washington, D.C.: V. H. Winston & Sons.

Ainsworth, S. M. D., Blehar, M. C., Waters, E., & Wall, S. N. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Arthur, K. W. (2008). The Gamo hideworkers of southwestern Ethiopia and cross-cultural comparisons. *Anthropozoologica, 43*(1), 67-98.

Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: and evolutionary theory of socialization. *Child development, 62*(4), 647-670.

Blurton Jones, N. (2002). The lives of hunter–gatherer children: Effects of parental behavior and parental reproductive strategy. In M. E. Pereira & L. A. Fairbanks (Eds.), *Juvenile primates: Life history, development, and behavior* (pp. 309-326). Chicago, IL: The University of Chicago Press.

Borke, J., Lamm, B., Eickhorst, A., & Keller, H. (2007). Father-infant interaction, paternal ideas about early child care, and their consequences for the development of children's self-recognition. *The Journal of genetic psychology, 168*(4), 365-379.

Bornstein, M. H., Tal, J., & Tamis-LeMonda, C. (1991). Parenting in cross-cultural perspective: The U.S., France, and Japan. In M. H. Bornstein (Ed.), *Cultural approaches to parenting* (pp. 69-90). Hilsdale, NJ: Erlbaum.

Bowlby, J. (1969). *Attachment and loss*. New York: Basic Books, Inc.

Bowlby, J. (1988). *A secure base*. Abingdon, Oxon, UK: Routeldge.

Bretherton, I., & Munholland, K. A. (2008). Internal working models in attachment relationships: Elaborating a central construct in attachment theory. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 102-127). New York, NY: Guilford Press.

Corbin, J., & Strauss, J. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2012). Qualitative inquiry and research design: Choosing among five approaches. Los Angeles: Sage Publications.

Darwin, C. (1965). *Expression of the emotions in man and animals*. New York, NY: D. Appleton and Company.

Draper, P., & Belsky, J. (1990). Personality development in evolutionary perspective. *Journal of Personality, 58*(1), 141-161.

Draper, P., & Harpending, H. (1987). Parent investment and the child's environment. In J. B. Lancaster, J. Altmann, A. S. Rossi, & L. R. Sherrod (Eds.), *Parenting across the life span - Biosocial dimensions* (pp. 207-235). Hawthorne, NY: Aldine de Gruyter.

Fouts, H. N. (2010). Bofi foragers and farmers: Case studies on the determinats of parenting behavior and early childhood experiences. In C. M. Worthman & P. Plotsky (Eds.), *Formative experiences: The interaction of caregiving, culture, and developmental psychobiology* (pp. 170-183). Cambridge: Cambridge University Press.

Fouts, H. N., Hewlett, B. S., & Lamb, M. E. (2005). Parent‐Offspring Weaning Conflicts among the Bofi Farmers and Foragers of Central Africa. *Current Anthropology, 46*(1), 29-50.

Fouts, H. N., Hewlett, B. S., & Lamb, M. E. (2012). A biocultural approach to breastfeeding interactions in Central Africa. *American anthropologist, 114*(1), 123-136.

Fouts, H. N., & Lamb, M. E. (2005). Ethical issues in cross-cultural research. In C. B. Fisher & R. M. Lerner (Eds.), *Encyclopedia of applied developmental science* (Vol. 1, pp. 409-412). Thousand Oaks, CA: Sage.

Fouts, H. N., & Lamb, M. E. (2009). Cultural and Developmental Variation in Toddlers' Interactions With Other Children in Two Small-Scale Societies in Central Africa. *International Journal of Developmental Science, 3*(4), 389-407. doi:doi: 10.3233/DEV-2009-3405.

Gartstein, M. A., Bogale, W., & Meehan, C. L. (2016). Adaptation of the Infant Behavior Questionnaire-Revised for use in Ethiopia: Expanding cross-cultural investigation of temperament development. *Infant Behavior and Development, 45*, 51-63.

Gottlieb, A. (2004). *The afterlife is where we come from*. Chicago: The University of Chicago Press.

Harwood, R. L., Miller, J. G., & Irizarry, N. L. (1995). *Culture and attachment - Perceptions of the child in context*. New York, NY: The Guilford Press.

Hatfield, E., Carpenter, M., & Rapson, R. L. (2014). Emotional contagion as a precursor to collective emotions. In C. von Scheve & M. Salmela (Eds.), *Collective emotions* (pp. 108-122). Oxford, UK: Oxford University Press.

Hewlett, B. S., & Lamb, M. E. (2002). Integrating evolution, culture and developmental psychology: explaining caregiver-infant proximity and responsiveness in central Africa and the USA. In H. Keller, Y. H. Poortinga, & A. Schölmerich (Eds.), *Between culture and biology: Perspectives on ontogenetic development* (pp. 241-269). Cambridge, UK: Cambridge University Press.

Hewlett, B. S., Lamb, M. E., Leyendecker, B., & Schölmerich, A. (2000a). Internal working models, trust, and sharing among foragers. *Current Anthropology, 41*(2), 287-297. doi:10.1086/300135

Hewlett, B. S., Lamb, M. E., Leyendecker, B., & Schölmerich, A. (2000b). Parental investment strategies among Aka foragers, Ngandu farmers, and Euro American urban-industrialists. In L. Cronk, N. Chagnon, & W. Irons (Eds.), *Adaptation and human behavior: An anthropological perspective* (pp. 155-178). New York: Walter de Gruyter, Inc.

Hochberg, Z. e., & Belsky, J. (2013). Evo-devo of human adolescence: beyond disease models of early puberty. *BMC medicine, 11*(1), 1.

Holodynski, M. (2009). Milestones and mechanisms of emotional development. In B. Röttger-Rössler & H. J. Markowitsch (Eds.), *Emotions as bio-cultural processes* (pp. 139-163). New York, NY: Springer.

Irwin, R. (2009). Culture shock: negotiating feelings in the field. *Anthropology Matters, 9*(1).

Izard, C. E. (1979). *The maximally discriminative facial movement coding system (MAX)*. Newark: Univesity of Delaware.

Keller, H. (2013). Attachment and Culture. *Journal of Cross-Cultural Psychology, 44*(2), 175-194. doi:10.1177/0022022112472253

Keller, H. (2014). Introduction: Understanding relationships - What we would need to to conceptualize attachment as the cultural solution of a universal developmental task. In H.

Otto & H. Keller (Eds.), *Different faces of attachment - Cultural variations on a universal human need* (pp. 1-24). Cambidge: Cambridge University Press.
Keller, H., Lamm, B., Abels, M., Yovsi, R., Borke, J., Jensen, H., . . . Tomiyama, A. J. (2006). Cultural Models, Socialization Goals, and Parenting Ethnotheories A Multicultural Analysis. *Journal of Cross-Cultural Psychology, 37*(2), 155-172.
Keller, H., & Otto, H. (2009). The cultural socialization of emotion regulation during infancy. *Journal of Cross-Cultural Psychology, 40*(6), 996-1011.
Keller, H., Voelker, S., & Yovsi, R. D. (2005). Conceptions of parenting in different cultural communities: The case of West African Nso and Northern German women. *Social Development, 14*(1), 158-180. doi:10.1111/j.1467-9507.2005.00295.x
Keller, H., Yovsi, R., Borke, J., Kartner, J., Jensen, H., & Papaligoura, Z. (2004). Developmental consequences of early parenting experiences: Self-recognition and self-regulation in three cultural communities. *Child development, 75*(6), 1745-1760. doi:10.1111/j.1467-8624.2004.00814.x
Kilbride, P. L., & Kilbride, J. E. (1983). Socialization for high positive affect between mother and infant among the Baganda of Uganda. *Ethos, 11*(4), 232-245.
Lamb, M. E., Thompson, R. A., Gardner, W., & Charnov, E. L. (1985). The biological interpretation of Strange Situation behavior *Infant-mother attachment: The origins and developmental significance of individual differences in Strange Situation behavior* (pp. 45-58). Hillsdale, NJ: Lawrence Earlbaum Associates, Inc.
Lamb, M. E., Thompson, R. A., Gardner, W. P., Charnov, E. L., & Estes, D. (1984). Security of infantile attachment as assessed in the "strange situation": Its study and biological interpretation. *Behavioral and Brain Sciences, 7*(01), 127-147.
LeVine, R. A. (1970). Personality and change. In J. N. Paden & E. W. Soja (Eds.), *The African experience: Volume 1 Essays* (pp. 276-303). Evanston, Il: Northwestern University Press.
LeVine, R. A. (1977). Child rearing as cultural adaptation. In P. H. Leiderman, S. R. Tulkin, & A. Rosenfeld (Eds.), *The child psychology series* (pp. 15-27). New York, NY: Academic Press, Inc.
LeVine, R. A. (1980). A cross-cultural perspective on parenting. In M. D. Fantini & R. Cardenas (Eds.), *Parenting in a multicultural society* (pp. 17-26). New York: Longham.
LeVine, R. A., Dixon, S., LeVine, S., Richman, A., Keefer, C. H., Brazelton, T. B., & Leiderman, P. H. (1996). *Child care and culture: Lessons from Africa*: Cambridge University Press.
Lozoff, B., & Brittenham, G. (1979). Infant Care - Cache or Carry. *Journal of Pediatrics, 95*(3), 478-483. doi:10.1016/S0022-3476(79)80540-5
Malatesta, C. Z., & Izard, C. E. (1984). The ontogenesis of human social signals: From biological imperative to symbol utilization. In N. A. Fox (Ed.), *The psychobiology of affective development* (pp. 161-206). Hillsdale, N.J.: L Erlbaum Associates.
Meehan, C. L., & Roulette, J. W. (2013). Early supplementary feeding among central African foragers and farmers: A biocultural approach. *Social science & medicine, 96*, 112-120.
Miyake, K., Chen, S. J., & Campos, J. J. (1985). Infant Temperament, Mothers Mode of Interaction, and Attachment in Japan - an Interim-Report. *Monographs of the Society for Research in Child Development, 50*(1-2), 276-297. doi:10.2307/3333838
Otto, H., & Keller, H. (Eds.). (2014). *Different face of attachment - Cultural variations on a universal human need*. Cambridge: Cambridge University Press.

Pellegrini, A. (2013). *Observing children in their natural world - A methodologial primer* (3rd ed.). New York, NY: Psychology Press.

Peshkin, A. (1988). In search of subjectivity—one's own. *Educational researcher, 17*(7), 17-21.

Pomerlau, A., Malacuit, G., & Sabatier, C. (1991). Child-rearing practices and parental beliefs in three cultural group of Montreal: Quebecois, Vietnamese, and Haitians. In M. H. Bornstein (Ed.), *Cultural approaches to parenting* (pp. 45-68). Hilsdale, NJ: Erlbaum.

Preston, S. D., & de Waal, F. B. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences, 25*(1), 1-20.

Quinn, N., & Mageo, J. M. (2013). *Attachment reconsidered: Cultural perspectives on a Western theory*. New York: Palgrave Macmillan.

Reddy, V. (1991). Playing with others' expectations: Teasing and muching about in the first year. In A. Whiten (Ed.), *Natural theories of mind: Evolution, development and simulation of everyday mindreading* (pp. 143-158). Oxford, UK: Basil Blackwell.

Sagi, A., Lamb, M. E., Lewkowicz, K. S., Shoham, R., Dvir, R., & Estes, D. (1985). Security of infant-mother,-father, and-metapelet attachments among kibbutz-reared Israeli children. *Monographs of the Society for Research in Child Development*, 257-275.

Shore, B. (1996). *Culture in mind: Cognition, culture, and the problem of meaning*. Oxford, UK: Oxford University Press.

Shwalb, D. W., Shwalb, B. J., & Shofi, J. (1996). Japanese mothers: Ideas about infants and temperament. In S. Harkness & C. M. Super (Eds.), *Parents' cultural belief systems* (pp. 169-191). New York: Guildford Press.

Sroufe, L. A., & Waters, E. (1977). Attachment as an organizational construct. *Child development*, 1184-1199.

Strauss, C., & Quinn, N. (1997). *A cognitive theory of cultural meaning*. Cambridge, UK: Cambridge University Press.

Super, C. M., & Harkness, S. (1974). Patterns of Personality in Africa ‐ . A Note from the Field. *Ethos, 2*(4), 377-381.

Super, C. M., & Harkness, S. (1986). The developmental niche: A conceptualization at the interface of child and culture. *International Journal of Behavioral Development, 9*(4), 545-569.

Trevarthen, C. (1979). Communication and cooperation in early infancy: A description of primary intersubjectivity. In M. Bullowa (Ed.), *Before speech: The beginning of interpersonal communication* (pp. 530-571). New York, NY: Cambridge University Press.

Tronick, E. Z. (1989). Emotions and emotional communication in infants. *American Psychologist, 44*(2), 112-119.

van Ijzendoorn, M. H., & Kroonenberg, P. M. (1988). Cross-cultural patterns of attachment: A meta-analysis of the strange situation. *Child development*, 147-156.

van Ijzendoorn, M. H., & Sagi-Schwartz, A. (2008). Cross-cultural patterns of attachment. In P. R. Shaver & J. Cassidy (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 880-905). New York: The Guilford Press.

Wanjohi, M., Griffiths, P., Wekesah, F., Muriuki, P., Muhia, N., Musoke, R. N., . . . Kimani-Murage, E. W. (2017). Sociocultural factors influencing breastfeeding practices in two slums in Nairobi, Kenya. *International Breastfeeding Journal, 12*(1), 5.

Weiner-Levy, N., & Popper-Giveon, A. (2010). Olive Oil, Chocolates and a Bright Blue Sweater: Power Relations and the Implications of Gifts in the Field. *Qualitative Sociology*, *33*(2), 185-204.

Weisner, T. S., Gallimore, R., Bacon, M. K., Barry III, H., Bell, C., Novaes, S. C., . . . Nerlove, S. B. (1977). My brother's keeper: Child and sibling caretaking. *Current Anthropology*, 169-190.

Whiting, B. B., & Edwards, C. P. (1988). *Children of different worlds: The formation of social behavior*. Cambridge, MA: Harvard University Press.

Wolf, A. A., Lozoff, B., Latz, S., & Paludetto, R. (1996). Parental theories in the management of young chilren's sleep in Japan, Italy, and the United States. In S. Harkness & C. M. Super (Eds.), *Parents' cultural belief systems* (pp. 346-384). New York: Guildford Press.

Yovsi, R. D., & Keller, H. (2003). Breastfeeding: An adaptive process. *Ethos*, *31*(2), 147-171. doi:10.1525/eth.2003.31.2.147

Zahn-Waxler, C. (2002). Caregiving, emotion, and concern for others. In S. D. Preston & F. B. M. d. Waal (Eds.), *Behavioral and Brain Sciences* (Vol. 25, pp. 48-49).

Appendix

Table 3.1 Participant characteristics (*N* = 29).

	n	*Min*	*Max*	*Mean*
Mother				
Age in Years		18	30	25
Years of Education		0	11	4.6
Number of Children		1	8	3
Time Working		0	.91	.45
Number of Children that have Died		0	2	0.2
Polygamous Marriage	1			
Monogamous Marriage	28			
Focal Child				
Age in Months		1	11	5.8
Birth Order		1	8	3
Female	17			
Male	12			

Chapter IV

Mothers' Feelings Towards Negative Emotional Displays and Mother-Infant Interactions among the Gamo of Southern Ethiopia

Abstract

Parents' exposure to stressful ecosocial situations, like inadequate resources, is linked to parents' perceptions of distress in infants as well as less sensitive caregiving. Economic stress has also been associated with more infant crying. However, studies supporting these findings predominantly come from Western contexts of parenting and infant care. In non-Western contexts researchers have found that infants who have parents that provide consistent care have been found to cry more in the presence of their parents in order to maintain proximity and continue to elicit care. Thus, ecosocial situations may have different affects on parenting and infants in different cultural contexts. In this study, the link between Gamo mothers' feelings (stressed vs. nonstressed) about their infants' negative emotional displays and mother-infant interactions was investigated. Mothers that expressed stress in response to their infants' negative emotional displays showed less mother-infant interactions compared to mothers that did not express stress. Interestingly, mothers that did not express stress had infants that fussed and cried more than infants of nonstressed mothers. This suggests that infants of nonstressed mothers may be fussing and crying more because their mothers interact with them more and by fussing and crying these infants may maintain these mother-infant interactions. It is unclear why some mothers expressed that they were stressed in response to their infants' emotional displays and other mothers did not; certain aspects of the Gamo ecocultural environment could have contributed to the pattern.

Introduction

Parents have beliefs about what is best for infants, and the environment in which the infant develops influences these beliefs and subsequent responses. In most families, mothers tend to be the primary caregivers of infants and their feelings about infants' emotions and what infants need in particular contexts trigger responses from mothers (Kärtner, Keller, & Yovsi, 2010; Keller & Otto, 2009). Over time, consistent responses from mothers lead infants to develop expectations about their mothers' responses (Bretherton & Munholland, 2008). This response in infancy is particularly important because it prepares the infant for future development and is regarded as the "brain imprint period" (Keller, 2008). Infants are biologically prepared, due to extensive neuroplasticity during the first months of life (for review see Feldman, 2007), to form internal working models (IWMs) (Bretherton & Munholland, 2008; Hewlett, Lamb, et al., 2000a) or mental states based on the nature of relationships with caregivers that predict future relationship formation (Keller, 2002). Infants elicit attention from their mothers through emotional displays and mothers' responses to those displays are guided by cultural scripts about what the infant needs (Keller, 2002).

In this study, we situate Gamo mothers' beliefs and mother-infant interactions within an ecocultural model of development (Keller, Kärtner, Gelfand, Chiu, & Hong, 2013; Weisner, 2002). The ecocultural perspective of development looks at how the ecosocial context and cultural models impact the developmental niche of the infant (Keller et al., 2013; Weisner, 2002). The ecosocial context includes socioeconomic structure (e.g., economic system and modes of subsistence), family structure (e.g., number of children and maternal age at birth), and household type (e.g., extended or nuclear family); and cultural models include adaptive beliefs and practices that reflect the ecosocial context (Keller et al., 2013). Cultural models of parenting

and childcare include socialization goals, parenting ethnotheories, and parenting behaviors that guide child development (Keller et al., 2013). Parents' socializations goals, parenting ethnotheories, and parenting behaviors vary depending on the context of child development. This study investigated the link between the ecocultural context of infant development and parenting among a group of small-scale agriculturalists living in Southern Ethiopia called the Gamo.

The Gamo live in a rural environment with limited resources and subsist mostly through agriculture. Very few families have surplus agricultural products to sell for extra income. Mothers are responsible for a majority of the childcare, harvesting, and cooking but rely on older siblings to help care for infants. Families typically have many children (some families in my sample had up to 8 children), so mothers often have help with childcare. Gamo children are expected to be obedient and respect the commands of their parents. When infants fuss or cry mothers typically respond quickly if present or ask a sibling to respond so that they can continue working. In our qualitative study of Gamo mothers' beliefs about their infants' emotions, we found that Gamo mothers would say that infant fussing and crying could be related to illness and that they needed to respond with breastfeeding and holding to stop the infant from fussing and crying (Bader & Fouts, *forthcoming*). Many mothers often discussed the conflict between their work demands and infant care (Bader & Fouts, *forthcoming*). Mothers are vital to their families' well-being because of the amount of work they do to procure food; however, because mothers are aware that they also need to care for their infants that could become sick without breastfeeding and holding, we were interested to see how mothers felt about their infants' negative emotions (i.e., fussing, crying, sadness) and if their feelings were linked to mother-infant interactions.

The goal of this study is to examine the ecocultural context of mothers' feelings about infants' negative emotions and mother-infant interactions among a lesser-studied population, the Gamo agriculturalists in rural Southern Ethiopia. Specifically, we examined mothers' feelings about their infants' negative emotions and how they were related to certain aspects of the ecosocial and cultural contexts (e.g., economic system, modes of subsistence, parental ethnotheories, etc.) in which infants develop and thus lead to differences in mother-infant interactions.

Parental Stress, Negative Infant Emotionality and Mother-Infant Interactions

Prolonged infant crying has been shown to elicit negative emotions and heightened physiological arousal in U.S. caregivers (Frodi, 1985), and consequently, caregiver distress processes such as anxiety, anger, or aversion may be provoked (Frodi & Senchak, 1990; Zeskind & Lester, 1978). Furthermore, caregiver exposure to psychosocial and contextual stressors in the U.S. (i.e., inadequate resources) has been shown to be associated with more caregiver perceptions of distress in infants' faces (Dayton et al., 2016) and less sensitive caregiving (Belsky et al., 1991; Dayton et al., 2016; Pianta & Egeland, 1990; Pianta, Sroufe, & Egeland, 1989). U.S. mothers' self-reported economic stress has also been shown to be related to mothers' reports of negative mother-infant interactions (Coyl, Roggman, & Newland, 2002).

Researchers have long suggested that infant crying is adapted (or evolved) to promote maternal proximity (Barr, 1990; Bell & Ainsworth, 1972; Bowlby, 1988; van Ijzendoorn & Hubbard, 2000); however, an infant's attempt at gaining proximity through crying could be influenced by parental stress stemming from a lack of sufficient resources (Hrdy, 1999) and in some cases could lead to parental neglect (e.g., Brewster, Nelson, McCanne, Lucas, & Milner, 1998). Furthermore, economic disadvantage may influence the degree to which infant distress

negatively affects mother-infant interactions (van den Boom, 1994). Mothers' negative life experiences in the Netherlands have also been associated with higher levels of infant fussing and crying during the first 6 months postpartum (Wurmser et al., 2006). Furthermore, Out, Pieper, Bakermans-Kranenburg, and van Ijzendoorn (2010) found genetic difference in adults' physiological reactivity to infant crying in the Netherlands and suggested that variation in reactivity may be inherited. Out and colleagues (2010) suggested that variation in reactivity to infant crying could also be due to parents' early experiences (i.e., early life stress; child maltreatment).

These aforementioned patterns in maternal stress, levels of infant crying and fussing, and mother-infant interactions, however, may not be applicable to infants in all contexts. Models of Western infant care suggest that stress associated with economic disadvantage appears to be linked to mothers' perceptions of their infants' distress and subsequent interactions with their infants as well as levels of infant fussing and crying (van den Boom, 1994; Wurmser et al., 2006). Furthermore, these Western models suggest that economic disadvantage is linked to mothers' negative perceptions of their infants' distress and increased maternal distress (Brewster et al., 1998; Dayton et al., 2016). However, cultural beliefs about infant fussing and crying may help explain variation in mothers' perceptions of infant fussing and crying. For example, Zeskind (1983) found that inner-city African American mothers reported that they did not feel the same levels of distress in response to infant crying or urgency in responding to their infants' distress compared to inner-city European American mothers. African American mothers were also slower to respond to infants' cries compared to European American mothers (Zeskind, 1983) suggesting that infants' cries elicit varying responses from caregivers living in a similar

socioeconomic environment and that these responses may be related to cultural beliefs about infant crying.

Theories about why infants cry have been debated by many researchers (Barr, 1990; Bell & Ainsworth, 1972; for review see Soltis, 2004). Infant crying could be a signal for need, a signal of vigor, or a method to manipulate parents for resources (for review see Soltis, 2004). The theory of infant crying as a signal for need aligns with what Gamo mothers have said about their infants' fussing and crying and what they believe are the best responses (Bader & Fouts, *forthcoming*). When Gamo infants fuss and cry, mothers believe that their basic needs like breastfeeding and holding must be met (Bader & Fouts, *forthcoming*).

Zeifman (2001) argued that infants over 3 months of age are aware of individuals that provide them care and thus, cry more in their presence than in the presence of individuals who are less likely to respond to their crying. The level of infant distress may be a result of the amount of care provided by mothers; infants with mothers who are "highly motivated to provide care for them" (pp. 275) may learn to cry more in their presence (Zeifman, 2001). Fouts and Lamb (2005b) supported this hypothesis when they found that Bofi forager (Central Africa) children were more likely to fuss and cry in the presence of their mothers.

Sensitivity and responsivity to infant behavior is a part of the attachment relationship between mothers and their infants (Bowlby, 1988); however, lower sensitivity and responsivity is linked to maternal reports of stress among U.S. mothers (Teti, Nakagawa, Das, & Wirth, 1991; Vaughn, Egeland, Sroufe, & Waters, 1979). Cross-culturally, mothers tend to be the primary caregivers and often serve as secure bases for their infants (Posada et al., 2013; van Ijzendoorn & Kroonenberg, 1988) and the attachment relationship between mothers and infants is linked to infant social and emotional development (Bretherton & Munholland, 2008; Hewlett, Lamb,

Leyendecker, & Scholmerich, 2000). Furthermore, this attachment relationship is associated with IWMs that are linked to future interactions with others in terms of expectations (Bretherton & Munholland, 2008). Infants use fussing and crying as well as vocalizations and gestures as a signal for their primary caregivers (Bell & Ainsworth, 1972). Trevarthen (1979) hypothesized that mother-infant synchrony in infants' signals and mothers' responses results in positive communication between infants and when mothers are unresponsive to infants' signals, infants begin to show distress in their facial expressions and vocalizations.

Increases in U.S. mothers' reports of stressful life events have been linked to changes in the attachment relationship between mothers and their infants (Vaughn et al., 1979). Secure attachment relationships between mothers and their infants at 12 months were linked to anxious attachment relationships between mothers and infants among mothers that had reported the occurrence of more stressful life events (Vaughn et al., 1979). Mothers' reports of parenting stress was also associated with differences in attachment security using maternally-derived Attachment Q-Set scores among U.S. mothers (Teti et al., 1991). Less secure children (measured through mothers' Q-set) were linked to more maternal perceptions of their children as stressful, and Q-set security was positively related to maternal sensitivity, involvement, and sociability towards their infants (Teti et al., 1991)

The Ecocultural Context of Development

Cultural beliefs about infant emotion and parenting among agriculturalists. Researchers have identified cultural beliefs about particular aspects of parenting like breastfeeding, weaning, and holding that suggest that other aspects of early childcare may also be linked to cultural conceptions of what is appropriate for children (Fouts, Hewlett, et al., 2012; Fouts & Lamb, 2005b; Hewlett, Lamb, et al., 2000b; Meehan & Roulette, 2013). For example,

Beng (Cote d'Ivoire) parents believe that infants are spiritual beings and reincarnations of ancestors and as infants become older, they slowly exit *wrugbe* (spirit land) from which they once lived (Gottlieb, 2004). Infants' cries are regarded as communication to caregivers that the infant wants to be respected and perceived as a fellow human while also communicating "I miss my home" and "please give me something to remind me of home" referring to *wrugbe* (Gottlieb, 2004, p. 88). Beng mothers respond by adorning infants with jewelry to demonstrate mothers' respect for their infants and that they value their infants (Gottlieb, 2004). The Nso (Cameroon) believe that a good child is one who is calm and does not express negative emotions like crying because this signals health problems (Keller & Otto, 2009). Nso mothers believe that breastfeeding promotes calmness in infants and should be employed prior to infants' distress signals rather than a reaction to their distress (Keller & Otto, 2009). Gusii (Kenya) mothers believe that infants' cries should elicit immediate response and that mothers should be capable of calming their infants (LeVine, Dixon, LeVine, Richman, Keefer, et al., 1996). Letting an infant cry for long periods of time is regarded as disgraceful (LeVine, Dixon, LeVine, Richman, Keefer, et al., 1996).

Cultural beliefs about infant crying appear to relate to particular responses from mothers based on what an infant cry means to the mother. These beliefs also demonstrate adaptiveness to particular environments in which children are raised. Parents who emphasize infant survival appear intent on reducing infant distress rather than eliciting positive reactions from infants that is often found in the parenting strategies of Western middle-class parents (Keller, 2000; LeVine, 1980).

Ecological adaptationist perspectives on parenting strategies and goals. Ecological adaptationist theories (e.g., human behavioral ecology) predict that types and amounts of parental investment in children that enhance reproductive success and survival are influenced by variations in the environment (Cronk, 1991; Winterhalder & Smith, 2000). Behavioral ecological perspectives attempt to explain variation in the timing and amount of parental investment (Pennington & Harpending, 1988; Winterhalder & Smith, 2000) through the constraints of the physical and social environment (e.g., infant/child mortality rates, available alloparents, parental resources) (Draper & Harpending, 1987; Winterhalder & Smith, 2000). Blurton Jones (2002) outlined three different parenting strategies that enhance reproductive success in different environments. In societies where parents engage in production enhancing parenting strategies (a common strategy in many agricultural societies) (e.g., parents are less responsive to their children and wean early), children are expected to participate in work and provide for the family so that mothers can devote resources to pregnancy and lactation (Blurton Jones, 2002). In contrast, the survivorship enhancing parenting strategy (a common strategy among some forager populations) promotes child survival through on-demand feeding and high levels of responsiveness and warmth (Blurton Jones, 2002).

Similar to Blurton Jones (2002), LeVine (1980) identified different parenting strategies or goals that related to aspects of the parents' environment. In environments with high infant mortality rates, parents tend to invest in the health and survival of their children; in societies with the primary focus on infant survival, children are perceived as a benefit to the welfare of the family (LeVine, 1980). In societies where infant survival is not a primary concern, parents invest in the economic well-being of their children and work to instill culturally-appropriate values in their children (e.g., wealth, individuality, intellectual achievement, personal

satisfaction, etc.) (LeVine, 1980). For example, Nso parents' main concern is the survival of their infants (due to similarly high risk of infant mortality and disease), and secondary socialization goals contribute to variations in mother-infant interactions during breastfeeding (i.e., mutual facial behaviors, body contact, tactile stimulation, etc.) (Yovsi & Keller, 2003). The social environment of a community contributes to these secondary socialization goals (i.e., instilling cultural values like autonomy and individuality) and can also influence how parents respond to their infants (Hewlett, Lamb, et al., 2000a; Super & Harkness, 1986; Yovsi & Keller, 2003). !Kung forager parents are very responsive to infants' protests towards being left by their mothers, so mothers often carry infants while gathering, whereas Hadza forager mothers have been observed ignoring infants' protests and displays of distress (Blurton Jones, 2002).

Guided by an ecocultural perspective, we investigated the ecocultural context of Gamo infants' negative emotions and mother-infant interactions. This perspective led us to consider what infant fussing, crying, and sadness meant to the Gamo and how mothers' feelings about negative infant emotions were related to mother-infant interactions. Furthermore, we investigated whether other ecological factors were associated with variation in mother-infant interactions. This approach led to the following research questions:

1) How do Gamo mothers feel about their infants' negative emotional displays and are there differences in mothers' feelings when their infants display negative emotions (e.g., sadness, fussing, and crying)?
2) If Gamo mothers do differ in their feelings towards their infants' negative emotions, is this linked to variation in mother-infant interactions?
3) Are infant gender, age, and birth order as well as maternal work level linked to variation in mother-infant interactions?

We developed a number of hypotheses based on the literature reviewed above. 1) Gamo cultural beliefs about infants' negative emotions as signs of physical illness may lead to many mothers feeling negatively about their infants' negative emotional displays; 2) however, research has shown that mothers perceive infants' negative emotions differently in similar ecological contexts (Zeskind, 1983), so Gamo mothers may vary in their feelings about negative infant emotions. 3) Because economic disadvantage is linked to maternal perceptions of infant distress in infants' faces (Dayton et al., 2016) and reduced maternal sensitivity (Belsky et al., 1991) and negative mother-infant interactions (Coyl et al., 2002), we hypothesized that some mothers would express distress in response to infants' negative emotions and that this would be linked to fewer mother-infant interactions. 4) Because of the work demands on women in agricultural societies like the Gamo (Hewlett, Lamb, et al., 2000b; LeVine, Dixon, LeVine, Richman, Keefer, et al., 1996) and research suggesting that the increased work demands and resulting stress of mothers in agricultural societies may make them less responsive to infants (Hewlett, Lamb, et al., 2000b), we expected that higher work levels would be related to fewer mother-infant interactions. 5) We also expected more mother-infant interactions among firstborn infants because research has shown that mothers tend to spend more time in the presence of their firstborn children (Keller & Zach, 2002). 6) Also, because infants' needs change with age in the first year of life, which has been documented among other agricultural societies in which mothers spend more time with infants in their first few months of life (LeVine, Dixon, LeVine, Richman, Leiderman, et al., 1996), we expected that as infants aged, there would be fewer mother-infant interactions. 7) Lastly, guided by evolutionary theories on gender differences in mother-infant interactions in which mothers will invest more in female infants in unstable environments because of their

reproductive chances compared to males (Keller & Zach, 2002; Trivers, 1974), we expected more mother-infant interactions between mothers of female infants.

Methods

Ethnographic Background

Data for this study were collected during fieldwork in 2015 and 2016 among the Gamo in a village of about 2,000 residents in the Gamo-Dorze highlands of Southern Ethiopia. The Gamo grow agricultural products like beans, potatoes, wheat, and barley for food and income; however, many Gamo men also weave for extra income and some women make bread and serve tea to residents of the village for extra income. Gamo men primarily plow the land and women are responsible for the majority of harvesting, cooking, cleaning, and childcare. The Gamo have a number of social classes (some no longer recognized); however, the two predominant social classes consist of a marginalized minority known as the *Degala*, who unlike the *Mala* (the majority group), subsist through hide working, blacksmithing, and some farming. Gamo hideworkers (Degala) must marry within their social class and have a lower economic status and fewer political opportunities compared to the Mala (Arthur, 2008). Most Degala live in a designated area within the village separated from the Mala known as *Godare* (means hyena in Gamo – the Gamo are particularly scared of hyenas). The Degala community surveyed in this study all come from one family lineage. The Degala are bound by social rules meant to separate them from the Mala. For example, Degala are not allowed to enter the homes of the Mala. They must stop at the entrance to the home. The Degala have very little farmland and most only use hand plows. Around 2,000 residents (2016 census) live in the surveyed village that is within the region of the Gamo-Dorze highlands. Gamo society is patriarchal and hierarchically structured by age. Gamo men inherit land from their fathers and when women marry, they usually move

into the compound of their husband's family. Gamo women are considered workers for their husband's family and must obey the orders of their husband's parents. Gamo children are expected to be obedient and respectful of their parents and other members of the community, especially elders. Older siblings are expected to care for infants throughout the day in order to allow mothers to work in the fields or cook at home. Most Gamo are Christians, either Evangelical Protestant or Ethiopian Orthodox.

Participants

Participants consisted of 29 focal infants and their mothers. Six participants were removed from the sample because they expressed anger in response to their infants' fussing and crying. The main focus of our study was to investigate the link between expressed maternal stress and differences in mother-infant interactions, so these 6 participants were removed prior to analysis. The final sample consisted of 23 participants (N = 4 Degala; N = 19 Mala). Data collection included demographic interviews with mothers and fathers, qualitative interviews with mothers, focal infant observations, and qualitative field notes. The Institutional Review Board at the University of Tennessee approved all research procedures.

Procedure

Parents were responsible for providing consent for their infants to be observed. Demographic interviews and parenting interviews with mothers of focal-infants were conducted by the first author during visits to participants' homes followed by three separate focal-infant observations conducted on different days within the span of a few weeks. Focal-infants were mostly observed at home, but occasionally, mothers would take them on their backs to the fields to collect crops or bring food to their husbands who were plowing; however, the first author

followed mothers and focal-infants to the fields or wherever else mothers took their infants with them throughout the village.

Instruments.

Demographic interview. Structured demographic interviews were conducted with mothers of focal children in order to gather information concerning the parents' age, ethnicity, clan, SES, and characteristics regarding biological children (e.g., age, gender, residence, etc.). Demographic interviews were audio recorded and collected with the help of a research assistant fluent in English, Amharic, and Gamo. Demographic interviews were later transcribed from audio recordings of the English translation. Information from demographic interviews was used to identify child and family characteristics.

Parenting interview. Interviews with mothers were conducted regarding their beliefs about infant care and infants' emotions. For the purposes of this study, only questions related to mothers' feelings about their infants' negative emotions were analyzed. Within these questions, mothers were specifically asked about how they felt in response to their infant's negative emotions.

Focal-infant observations. Focal-infant observations (Altmann, 1974) provided quantitative behavioral data on infant behaviors as well as caregivers' responses to infant behaviors. This technique involved observing one infant at a time and recording the behaviors of the infant as well as various infant-caregiver interactions. The behaviors were recorded on-the-mark, as determined by a cell phone application that delivered verbal commands to "observe" for 20-seconds and then to "record" the observed behaviors on a detailed checklist for the next 10-seconds. The observe/record signals were delivered through a small earphone worn by the observer.

Observational codes for infant behaviors and caregiver-infant interactions were adapted from the codes of Belsky, Taylor, and Rovine (1984) that were used for focal-infant observations and have been adapted for other research utilizing focal-infant observations in many different contexts (Fouts et al., 2005; Fouts, Roopnarine, Lamb, & Evans, 2012; Leyendecker, Lamb, & Schölmerich, 1997). Refer to Table 4.1 for definitions of coded mother behaviors directed towards the infant and infant behaviors directed towards the mother. Refer to Table 4.2 for frequencies and percentages of infant behaviors directed towards the mother prior to being grouped in factor analyses and Table 4.3 for frequencies and percentages of mother behaviors directed towards the infant prior to being grouped in factor analyses. Each infant was observed for 2 hours on 3 separate days in order to cover the main parts of the day, usually from breakfast to the end of the workday. The 2-hour observation sessions were divided into two 45-minute segments, with 15-minute rest periods after each segment to prevent observer fatigue and to allow for the documentation of qualitative field notes. Each child was thus observed for a total of 4.5 hours, or 540 30-second observation points. Prior to data collection, the data collector (first author) was trained over a 3-week period at the University of Tennessee Early Learning Center. Coding with a trained observer resulted in 90% agreement on all codes prior to data collection in the field. Interobserver agreement was reassessed following the completion of fieldwork. A trained observer recorded the behaviors of the same focal-infant that was observed in the field by the first author from 30-minute video recordings of those same infants. Interobserver agreement was calculated between what the first author recorded in the field and what the trained observer recorded from videos. Agreements reflect the percentage of exact agreements regarding each behavior that was coded. Cohen's kappa was used to calculate interobserver agreements. For identifying maternal affection, attachment behaviors, and distress,

the observers agreed 100% of the time. Cohen's kappa coefficients were as follows: maternal proximal soothe = 0.80, mother stimulates/caregives = 0.47, positive mother-infant interaction = 0.44. Percent agreement for mother stimulates/caregives and positive mother-infant interaction was over 90%, which suggests that the Cohen's kappa coefficients for these behaviors were low because they occurred infrequently.

Factor analysis. Factor analyses were used to identify mother and infant behaviors that demonstrated similar patterns and could thus be grouped together.

Infant behaviors directed towards the mother

Fourteen infant behaviors directed towards the mother were entered into a factor analysis (Table 4.4). Guided by principle component analysis, five of the 14 behaviors [(1) infant smiles at mother, (2) infant laughs at mother, (3) infant responds to mother, (4) infant gestures to mother, and (5) infant plays with mother] formed an index scale of Positive Infant-Mother Interaction (Cronbach's α = .79, 23.96% of the variance explained). In addition, three of the 14 behaviors [(1) infant proffers to mother, (2) infant crawls in the lap of the mother, and (3) infant reaches toward the mother] formed an index scale of Attachment Behaviors (Cronbach's α = .72; 17.95% of the variance explained). Lastly, two of the 14 behaviors [(1) infant fuss for mother, and (2) infant cry for mother] formed an index scale named Infant Distress (Cronbach's α = .67; 13.16% of the variance explained).

Mothering behaviors directed towards infant

Thirteen mothering behaviors were entered into a factor analysis (Table 4.5). Guided by principle component analysis, four of the 13 behaviors [(1) mother holds infant, (2) mother is in physical contact with infant, (3) mother is proximal to infant, (4) mother physically soothes infant] formed an index scale of Maternal Proximal Soothe (Cronbach's α = .86; 24.67% of the

variance explained). In addition, three behaviors [(1) mother displays physical affection toward infant, (2) mother displays nonphysical affection toward infant, and (3) mother is in face-to-face interaction with infant] formed an index scale of Maternal Affection (Cronbach's α = .77; 18.98% of the variance explained) and four of the 13 behaviors [(1) mother nonphysically soothes infant, (2) mother vocalizes to infant, and (3) mother stimulates/arouses infant, (4) mother caregives infant] formed an index scale of Mother Stimulates and Caregives (Cronbach's α = .61; 18.64% of the variance explained).

Analytic Plan

We conducted a constant comparative analysis to look for patterns in mothers' feelings about their infants' negative emotions (e.g., crying, fussing, sadness). Codes were then created from patterns in mothers' feelings towards their infants' emotions and coded using NVivo. Mother and infant characteristics of mothers that did not express stress and mothers that did express stress mothers are displayed in Table 4.6. We ran t-tests and chi-squared tests to look for group differences between mothers that expressesd stress and mothers that did not express stress. Because of the literature on mothers' work level, infant age, infant gender and firstborn status and the links between these variables and mother-infant interactions, these variables were also used as predictor variables to investigate variation in mother-infant interactions. T-tests, chi-square tests, and regressions were all run using bootstrapping. Bootstrapping, performed in SPSS, resamples from the original sample in order to estimate the sampling distribution of a statistic (Mooney & Duval, 1993). This then results in an estimated sampling distribution that is used to make population inferences (Mooney & Duval, 1993).

We ran T-tests to investigate the mean differences in mother-infant interactions in mothers that expressed stress and mothers that did not express. This was followed by multiple

linear regressions. The first regression used mothers' feelings towards infants' negative emotions (expressed stress vs. nonexpressed stress mothers), mothers' work level, infant age, infant gender, and birth order to predict variation in infant behaviors directed towards the mother. The second regression used mothers' feelings towards infants' negative emotions (expressed stress vs. nonexpressed stress mothers), mothers' work level, infant age, infant gender, and birth order to predict variation in mothering behaviors directed towards the focal-infant.

Results

Research Question 1

Gamo mothers' expressions of stress in response to their infants' negative emotions emerged as a theme throughout interviews with mothers. When Gamo mothers expressed feeling stressed in response to their infants' fussing and crying, they used the words *metetou* or *unnie* (Gamo) or *chink* (Amharic) These mothers were grouped by their similar expressions of stress in response to their infants' negative emotions. A second group of mothers who did not express stress in response to their infants' negative emotions also emerged. Due to studies demonstrating a link between maternal stress and variation in maternal involvement and sensitivity (Pianta & Egeland. 1990; Pianta et al., 1989), mothers were grouped into *stressed* or *nonstressed* groups in order to investigate variation in mother-infant interactions between groups.

Thirteen out of 23 mothers mentioned that they were often stressed when their infant was sad or fussed or cried. Of the 13 mothers that expressed stress, 2 Degala mothers mentioned that they felt stress in response to their infant's fussing and crying. Our translator translated mothers' statements about how they felt when their infants fussed and cried into English from the Gamo language. Mothers' expressions of stress in response to their infants' fussing and crying

emerged as a theme in our interviews. For example, one mother said, "when I hear her voice when she cries, I feel pain and I'm very stressed." Another mother stated, "she is crying a lot and it makes me very sad and stressed...I am begging God to give her more strength to sit and play by herself...that will make me a little bit free to work on other things." One mother said, "no one is taking care of the baby, just only me and it makes me have to stay home...if I went somewhere else, the baby will cry a lot and it makes me more stressed." Mothers that made similar statements about feeling stressed in response to their infants' fussing and crying were grouped together. Ten mothers did not mention that they felt stressed when their infants fussed or cried, so these mothers were grouped together as well.

Research Question 2 and 3

Comparing mean differences in *stressed* and *nonstressed* mother-infant interactions indicated a trend towards higher levels of interaction and emotional response among *nonstressed* compared to *stressed* mothers (see Table 4.7 and Figure 4.1). Interestingly, mean values also indicated a trend in higher infant fussing and crying for their mothers associated with *nonstressed* mothers. Even though the difference in amounts of infant fussing and crying for their mothers between *stressed* and *nonstressed* mothers was not significant, mean differences in fussing and crying for their mothers were apparent.

Next, two separate regression analyses were run to investigate how mothers' feelings towards their infants' negative emotions in conjunction with the other predictor variables (i.e., maternal work level, infant age, infant gender, and birth order predicted variation) were linked to interactions between mothers and infants (see Tables 4.8a & 4.8b). Infant age was predictive of both positive mother-infant interaction and infant attachment behavior. Infant age was positively associated with positive mother-infant interactions and infant attachment behaviors. Older

infants tended to have more positive mother-infant interactions as well as more attachment behaviors.

Discussion

We found that some Gamo mothers expressed that they were stressed in response to their infants' fussing, crying, and sadness. Group means between *stressed* and *nonstressed* mothers indicated that *stressed* mothers had fewer interactions with their infants compared to *nonstressed* mothers. Furthermore, group means indicated that *nonstressed* mothers had infants that fussed and cried more for their mothers than *stressed* mothers. Lastly, older infant age was associated with more positive mother-infant interactions and more infant attachment behaviors.

Gamo mothers' feelings towards infant fussing, crying, and sadness could be linked to the ecocultural environment in which the Gamo live. Gamo mothers often discussed how they have inadequate resources (i.e., lack of additional food and clothing) to support their children and mothers also talked about how they have many work demands but that these demands interfere with their ability to care for their young children; however many mothers have older children to help care for infants but some mothers mentioned that they had no help because the focal infant was their first child. Furthermore, Gamo mothers associate infant fussing and crying with illness. Dayton and colleagues (2016) found that maternal economic stress in the U.S. may be linked to perceptions of more infant distress. However, we did not find group difference in *stressed* and *nonstressed* mothers' SES but with a larger sample size, it's possible that maternal stress might be linked to more perceptions of infant distress. The Gamo ecocultural context of limited resources, high demands on mothers, and the importance of sibling caretaking suggests that multiple ecocultural factors could be linked to why some mothers said that they felt stressed in response to their infants fussing and crying.

Our results also suggested that there is a trend associated with *stressed* mothers and less interactions between mothers and infants. This trend is consistent with research demonstrating links between maternal stress and negative mother-infant interactions (Coyl et al., 2002) and less sensitive parenting (Belsky et al., 1991; Pianta & Egeland, 1990; Pianta et al., 1989). Furthermore, attachment research has shown maternal reports of stress and reports of stressful life events are linked to less maternal sensitivity and involvement with infants as well as fewer sociability an infant directs towards their mother (Teti et al., 1991; Vaughn et al., 1979). This is consistent with our results showing a trend for *stressed* Gamo mothers to engage in less interactions overall with their infants, including less sensitivity and responsiveness directed towards infants. Furthermore, there was a trend for *nonstressed* mothers to engage in more interactions with their infants. Interestingly, though, there was also a trend for *nonstressed* mothers to have infants that fussed and cried more for their mothers than infants of *stressed* mothers. Zeifman (2001) suggested that infants with consistently responsive caregivers may fuss and cry more in their presence to maintain care and proximity. Although we did not include maternal proximity in our analysis, we did measure the amount of infant fussing and crying for mothers. It is possible that *nonstressed* Gamo mothers were in the presence of their infants more often than *stressed* Gamo mothers, but this needs to be further examined. Furthermore, because *nonstressed* mothers had more interactions overall with their infants, these infants may be attempting to maintain these interactions with their mothers. This trend is consistent with Fouts and Lamb (2005b) who found that infants fussed and cried more in the presence of their mothers rather than when their mothers were away. Thus, infants of *nonstressed* Gamo mothers appear to spend more time in interactions with their mothers and their increased fussing and crying for their mothers may help maintain these interactions.

We also found that infant age predicted more positive mother-infant interactions and more infant attachment behaviors directed at mothers. Research has shown that infant smiling and laughing (components of positive mother-infant interactions) in anticipation or response to mothers' interactions increases with age (Sroufe & Waters, 1976). Around 2 months, infants also begin to perceive emotion in human faces but not until 5 months are infants able to demonstrate differential affective responses to positive and negative adult facial expressions (Klinnert, Campos, Sorce, Emde, & Svejda). Furthermore, as U.S. infants age, the frequency with which they respond (a component of positive mother-infant interactions) to their mothers also increases (Belsky et al., 1984). After 3 months, infants also begin to anticipate certain responses from their mothers after the display of particular emotions (Malatesta & Haviland, 1982). These studies are consistent with our findings that positive mother-infant interactions increase with infant age. We also found that attachment behaviors (i.e., reaching toward mother, crawling in lap of mother, and gesturing towards mothers) also increased with age and is consistent with research that has shown that at 6 months, infants begin to anticipate particular responses from their mothers and thus, display behaviors that reflect the mother-infant attachment relationship (Ainsworth et al., 1978) .

The ecocultural context of Gamo infants' environment of development gives some insights into mother-infant interaction and mothers' feelings about their infants' emotions. Gamo mothers' reports of stress in response to infants' fussing and crying are consistent with the literature demonstrating the effects of stress, especially economic stress, on mothers' perceptions of their infants' distress and maternal sensitivity and responsiveness. Furthermore, the trend associated with more infant fussing and crying for *nonstressed* mothers is consistent with literature on rural small-scale societies in Africa. Altogether, this study on mothers' feelings

towards their infants' fussing and crying and the links between these feelings and mother-infant interactions demonstrates the complexity of parenting and infant care. Furthermore, our finding of fewer mother-infant interactions among *stressed* Gamo mothers is consistent with research on maternal stress and responses to infants in Western contexts of development.

Limitations

Even though mean differences between *stressed* and *nonstressed* mother-infant interactions were not significant, with greater sample sizes, the mean differences in mother-infant interactions between *stressed* and *nonstressed* mothers may have become apparent. Overall, we expected mean differences in mother behaviors and infant behaviors directed towards the mother in *stressed* and *nonstressed* mothers. Furthermore, we cannot be entirely sure of the meaning of mothers' interpretations of our questions regarding their feelings towards negative infant emotionality; however, the meaning and interpretation of our questions were discussed at length with our translator and because there was a clear pattern in mothers' responses to questions, interpretation may not have been a serious issue. Another limitation is that we were unable to include fathers in this study. Fathers were mostly unavailable for the parenting interview in which feeling towards negative infant emotionality were assessed due to the planting season. It would be interesting to see how fathers' feelings towards their infants' negative emotionality affected father-infant interactions and furthermore if infants cried more in the presence of their fathers.

Conclusion

Gamo maternal stress may be linked to less mother-infant interactions; however, it is unclear why mothers that expressed stress have fewer mother-infant interactions. Further investigation into the ecocultural context of *stressed* mothers could help explain why these

mothers felt more stressed in response to their infants' fussing and crying. A larger sample size would allow for a deeper look into possible ecocultural factors contributing to mothers' expressions of stress including SES, maternal work, and birth order. Furthermore, there was a trend for infants of *nonstressed* mothers to display more fussing and crying for their mothers. This trend is consistent with research that has shown that infants fuss and cry more in the presence of their caregivers in order to elicit care from motivated caregivers. Stress experienced by some Gamo mothers appears to affect how these mothers interact with their infants and how infants respond to their mothers, which is consistent with literature from Western contexts of development. Multiple ecocultural factors like insufficient resources, mothers' work demands, and threats to infant health and survival could be responsible for mothers' expressions of stress. These ecocultural strains are similar to what mothers living in some Western contexts experience, and research has shown that these factors are associated with less sensitive and responsive mother-infant interactions. Thus, the link between maternal stress and its affect on mother-infant interactions may be a universal phenomenon, but further cross-cultural studies are needed to confirm this.

References

Ainsworth, S. M. D., Blehar, M. C., Waters, E., & Wall, S. N. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Altmann, J. (1974). Observational study of behavior: sampling methods. *Behaviour, 49*(3), 227-266.

Arthur, K. W. (2008). The Gamo hideworkers of southwestern Ethiopia and cross-cultural comparisons. *Anthropozoologica, 43*(1), 67-98.

Barr, R. G. (1990). The early crying paradox. *Human Nature, 1*(4), 355-389.

Bell, S. M., & Ainsworth, M. D. S. (1972). Infant crying and maternal responsiveness. *Child Development*, 1171-1190.

Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: and evolutionary theory of socialization. *Child Development, 62*(4), 647-670.

Belsky, J., Taylor, D. G., & Rovine, M. (1984). The Pennsylvania infant and family development project, II: The development of reciprocal interaction in the mother-infant dyad. *Child Development, 55*, 706-717.

Blurton Jones, N. (2002). The lives of hunter–gatherer children: Effects of parental behavior and parental reproductive strategy. In M. E. Pereira & L. A. Fairbanks (Eds.), *Juvenile primates: Life history, development, and behavior* (pp. 309-326). Chicago, IL: The University of Chicago Press.

Bowlby, J. (1988). *A secure base*. Abingdon, Oxon, UK: Routeldge.

Bretherton, I., & Munholland, K. A. (2008). Internal working models in attachment relationships: Elaborating a central construct in attachment theory. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 102-127). New York, NY: Guilford Press.

Brewster, A. L., Nelson, J. P., McCanne, T. R., Lucas, D. R., & Milner, J. S. (1998). Gender differences in physiological reactivity to infant cries and smiles in military families. *Child Abuse & Neglect, 22*(8), 775-788.

Coyl, D. D., Roggman, L. A., & Newland, L. A. (2002). Stress, maternal depression, and negative mother–infant interactions in relation to infant attachment. *Infant Mental Health Journal, 23*(1- 2), 145-163.

Cronk, L. (1991). Human behavioral ecology. *Annual review of anthropology*, 25-53.

Dayton, C. J., Huth-Bocks, A. C., & Busuito, A. (2016). The influence of interpersonal aggression on maternal perceptions of infant emotions: Associations with early parenting quality. *Emotion, 16*(4), 436-448.

Draper, P., & Harpending, H. (1987). Parent investment and the child's environment. In J. B. Lancaster, J. Altmann, A. S. Rossi, & L. R. Sherrod (Eds.), *Parenting across the life span - Biosocial dimensions* (pp. 207-235). Hawthorne, NY: Aldine de Gruyter.

Feldman, R. (2007). Parent–infant synchrony biological foundations and developmental outcomes. *Current Directions in Psychological Science, 16*(6), 340-345.

Fouts, H. N., Hewlett, B. S., & Lamb, M. E. (2005). Parent- Offspring Weaning Conflicts among the Bofi Farmers and Foragers of Central Africa. *Current Anthropology, 46*(1), 29-50.

Fouts, H. N., Hewlett, B. S., & Lamb, M. E. (2012). A biocultural approach to breastfeeding interactions in Central Africa. *American Anthropologist, 114*(1), 123-136.

Fouts, H. N., & Lamb, M. E. (2005). Weanling emotional patterns among the Bofi foragers of Central Africa *Hunter-gatherer Childhoods: Evolutionary, Developmental, and Cultural Perspectives* (pp. 309).

Fouts, H. N., Roopnarine, J. L., Lamb, M. E., & Evans, M. (2012). Infant Social Interactions With Multiple Caregivers: The Importance of Ethnicity and Socioeconomic Status. *Journal of Cross-Cultural Psychology, 43*(2), 328-348. doi:10.1177/0022022110388564.

Frodi, A. (1985). When empathy fails: Aversive infant crying and child abuse. In B. M. Lester & C. F. Zachariah Boukydis (Eds.), *Infant Crying: Theoretical and research perspectives* (pp. 263-277). New York, NY: Plenum Press.

Frodi, A., & Senchak, M. (1990). Verbal and behavioral responsiveness to the cries of atypical infants. *Child Development, 61*(1), 76-84.

Gottlieb, A. (2004). *The afterlife is where we come from*. Chicago: The University of Chicago Press.

Hewlett, B. S., Lamb, M. E., Leyendecker, B., & Scholmerich, A. (2000). Internal working models, trust, and sharing among foragers. *Current Anthropology, 41*(2), 287-297. doi:10.1086/300135.

Hewlett, B. S., Lamb, M. E., Leyendecker, B., & Schölmerich, A. (2000a). Internal working models, trust, and sharing among foragers. *Current Anthropology, 41*(2), 287-297. doi:10.1086/300135.

Hewlett, B. S., Lamb, M. E., Leyendecker, B., & Schölmerich, A. (2000b). Parental investment strategies among Aka foragers, Ngandu farmers, and Euro American urban-industrialists. In L. Cronk, N. Chagnon, & W. Irons (Eds.), *Adaptation and human behavior: An anthropological perspective* (pp. 155-178). New York: Walter de Gruyter, Inc.

Hrdy, S. B. (1999). *Mother nature: A history of mothers, infants, and natural selections*. New York: Pantheon.

Kärtner, J., Keller, H., & Yovsi, R. D. (2010). Mother–infant interaction during the first 3 months: The emergence of culture- specific contingency patterns. *Child Development, 81*(2), 540-554.

Keller, H. (2000). Human parent-child relationships from an evolutionary perspective. *American Behavioral Scientist, 43*(6), 957-969.

Keller, H. (2002). Development as the interface between biology and culture: a conceptualization of early ontogenetic experiences. In H. Keller, Y. H. Poortinga, & A. Schölmerich (Eds.), *Between culture and biology: Perspectives on ontogenetic development* (Vol. 8, pp. 215-240). New York, NY: Cambridge University Press.

Keller, H. (2008). Culture and biology: The foundation of pathways of development. *Social and Personality Psychology Compass, 2*(2), 668-681.

Keller, H., Kärtner, J., Gelfand, M., Chiu, C.-Y., & Hong, Y.-Y. (2013). The cultural solution of universal developmental tasks. *Advances in Culture and Psychology, 3*, 63-116.

Keller, H., & Otto, H. (2009). The cultural socialization of emotion regulation during infancy. *Journal of Cross-Cultural Psychology, 40*(6), 996-1011.

Keller, H., & Zach, U. (2002). Gender and birth order as determinants of parental behaviour. *International Journal of Behavioral Development, 26*(2), 177-184.

Klinnert, M. D., Campos, J. J., Sorce, J. F., Emde, R. N., & Svejda, M. Emotions as behavior regulator: Social referencing in infancy. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience* (Vol. 2, pp. 57-86). New York, NY: Academic Press.

LeVine, R. A. (1980). A cross-cultural perspective on parenting. In M. D. Fantini & R. Cardenas (Eds.), *Parenting in a multicultural society* (pp. 17-26). New York: Longham.

LeVine, R. A., Dixon, S., LeVine, S., Richman, A., Keefer, C. H., Brazelton, T. B., & Leiderman, P. H. (1996). *Child care and culture: Lessons from Africa*: Cambridge University Press.

LeVine, R. A., Dixon, S., LeVine, S., Richman, A., Leiderman, P. H., Keefer, C. H., & Brazelton, B. T. (1996). *Child Care and Culture: Lessons from Africa*. Cambridge, UK: Cambridge University Press.

Leyendecker, B., Lamb, M. E., & Schölmerich, A. (1997). Studying mother-infant interaction: The effects of context and length of observation in two subcultural groups. *Infant Behavior and Development, 20*(3), 325-337.

Malatesta, C. Z., & Haviland, J. M. (1982). Learning display rules - The socialization of emotion expression in infancy. *Child Development, 53*(4), 991-1003.

Meehan, C. L., & Roulette, J. W. (2013). Early supplementary feeding among central African foragers and farmers: A biocultural approach. *Social science & medicine, 96*, 112-120.

Mooney, C. Z., & Duval, R. D. (1993). *Bootstrapping: A nonparametric approach to statistical inference*. Newbury Park, CA: Sage Publications, Inc.

Out, D., Pieper, S., Bakermans- Kranenburg, M., & Van IJzendoorn, M. v. (2010). Physiological reactivity to infant crying: a behavioral genetic study. *Genes, Brain and Behavior, 9*(8), 868-876.

Pennington, R., & Harpending, H. (1988). Fitness and fertility among Kalahari !Kung. *American Journal of Physical Anthropology, 77*, 303-319.

Pianta, R. C., & Egeland, B. (1990). Life stress and parenting outcomes in a disadvantaged sample: Results of the mother-child interaction project. *Journal of Clinical Child Psychology, 19*(4), 329-336.

Pianta, R. C., Sroufe, L. A., & Egeland, B. (1989). Continuity and discontinuity in maternal sensitivity at 6, 24, and 42 months in a high-risk sample. *Child Development*, 481-487.

Posada, G., Lu, T., Trumbell, J., Kaloustian, G., Trudel, M., Plata, S. J., . . . Lay, K. L. (2013). Is the Secure Base Phenomenon Evident Here, There, and Anywhere? A Cross-Cultural Study of Child Behavior and Experts' Definitions. *Child development, 84*(6), 1896-1905. doi:10.1111/Cdev.12084.

Soltis, J. (2004). The signal functions of early infant crying. *Behavioral and Brain Sciences, 27*(04), 443-458.

Sroufe, A. L., & Waters, E. (1976). The ontogenesis of smiling and laughter: a perspective on the organization of development in infancy. *Psychological review, 83*(3), 173.

Super, C. M., & Harkness, S. (1986). The developmental niche: A conceptualization at the interface of child and culture. *International Journal of Behavioral Development, 9*(4), 545-569.

Teti, D. M., Nakagawa, M., Das, R., & Wirth, O. (1991). Security of attachment between preschoolers and their mothers: Relations among social interaction, parenting stress, and mother's sorts of the Attachment Q-Set. *Developmental Psychology, 27*(3), 440.

Trevarthen, C. (1979). Communication and cooperation in early infancy: A description of primary intersubjectivity. In M. Bullowa (Ed.), *Before speech: The beginning of interpersonal communication* (pp. 530-571). New York, NY: Cambridge University Press.

Trivers, R. L. (1974). Parent-offspring conflict. *American Zoologist, 14*(1), 249-264.

van den Boom, D. C. (1994). The influence of temperament and mothering on attachment and exploration: An experimental manipulation of sensitive responsiveness among lower-class mothers with irritable infants. *Child Development, 65*(5), 1457-1477.

van Ijzendoorn, M. H., & Hubbard, F. O. (2000). Are infant crying and maternal responsiveness during the first year related to infant-mother attachment at 15 months? *Attachment & Human Development, 2*(3), 371-391.

van Ijzendoorn, M. H., & Kroonenberg, P. M. (1988). Cross-cultural patterns of attachment: A meta-analysis of the strange situation. *Child Development*, 147-156.

Vaughn, B., Egeland, B., Sroufe, L. A., & Waters, E. (1979). Individual differences in infant-mother attachment at twelve and eighteen months: Stability and change in families under stress. *Child Development*, 971-975.

Weisner, T. S. (2002). Ecocultural understanding of children's developmental pathways. *Human development, 45*(4), 275-281.

Winterhalder, B., & Smith, E. A. (2000). Analyzing adaptive strategies: Human behavioral ecology at twenty-five. *Evolutionary Anthropology Issues News and Reviews, 9*(2), 51-72.

Wurmser, H., Rieger, M., Domogalla, C., Kahnt, A., Buchwald, J., Kowatsch, M., . . . Pirke, K.-M. (2006). Association between life stress during pregnancy and infant crying in the first six months postpartum: a prospective longitudinal study. *Early Human Development, 82*(5), 341-349.

Yovsi, R. D., & Keller, H. (2003). Breastfeeding: An adaptive process. *Ethos, 31*(2), 147-171. doi:10.1525/eth.2003.31.2.147.

Zeifman, D. M. (2001). Developmental aspects of crying: Infancy, childhood, and beyond. In J. M. Vingerhoets & R. R. Cornelius (Eds.), *Adult crying: A biopsychosocial approach* (pp. 37-54). Hove, UK: Routledge.

Zeskind, P. S. (1983). Cross-cultural differences in maternal perceptions of cries of low-and high-risk infants. *Child development*, 1119-1128.

Zeskind, P. S., & Lester, B. M. (1978). Acoustic features and auditory perceptions of the cries of newborns with prenatal and perinatal complications. *Child Development*, 580-589.

Appendix

Table 4.1 Infant and mother behaviors and descriptions

Behavior	Description
Infant behaviors	
Smile	Infant smiles at the mother
Laugh	Infant laughs at the mother
Responds	Infant shows a positive response to mother stimulation or vocalization
Play	Infant plays with mother
Gesture	Infant signals for attention from the mother through vocalizations or body movements
Proffer	Infant shows and object to the mother
Crawl in lap	Crawls into lap of mother
Reach	Reaches towards mother
Fuss	Infant manifests signs of agitation towards the mother and/or is upset and emits moans, whines, and whimpers
Cry	Infant cries at the mother
Mother behaviors	
Physical contact	Mother is in bodily contact with the infant
Hold	Mother holds infant in lap, wrap, arms
Proximal	Mother is within a foot of the infant
Physical soothe	Mother tries to physically quiet or calm the irritable or crying infant by rocking, patting, or swaying
Physical affection	Mother shows affection towards infant by patting, cuddling, nuzzling, hugging, or kissing
Nonphysical affection	Mother expresses verbal affection towards the infant
Face-to-face	Mother places herself and the infant in such a way that both are face-to-face, with the eyes on the same plane and at a distance of about a foot
Nonphysical soothe	Through verbal or visual expressions the mother tries to calm or quiet the irritable or crying infant
Vocalize	Mother talks to infant
Stimulate/arouse	Mother tries to focus the infant's attention on a specific event vocally and/or physically
Caregives	Grooming, wiping mucus off nose, drool off mouth and chin, feces off bottom, crust out of eyes, dress or undressing

Table 4.2 Frequencies of infant behaviors direct towards the mother

		Frequency	Percent			Frequency	Percent
Smile at Mother				***Proffer to Mother***			
Valid	.0	15465	99.9	Valid	.0	15478	100.0
	1.0	15	.1		1.0	2	.0
	Total	15480	100.0		Total	15480	100.0
Laugh at Mother				***Crawl in lap of Mother***			
Valid	.0	15468	99.9	Valid	.0	15475	100.0
	1.0	12	.1		1.0	5	.0
	Total	15480	100.0		Total	15480	100.0
Respond to Mother				***Reach towards Mother***			
Valid	.0	15459	99.9	Valid	.0	15470	99.9
	1.0	21	.1		1.0	10	.1
	Total	15480	100.0		Total	15480	100.0
Play with Mother				***Fuss for Mother***			
Valid	.0	15477	100.0	Valid	.0	15448	99.8
	1.0	3	.0		1.0	32	.2
	Total	15480	100.0		Total	15480	100.0
Gesture at Mother				***Cry for Mother***			
Valid	.0	15471	99.9	Valid	.0	15414	99.6
	1.0	9	.1		1.0	66	.4
	Total	15480	100.0		Total	15480	100.0

Total number of observed intervals per participant = 540 (540 x 29 = 15,660 total intervals observed; however, some participants had missing intervals, so there is a total of 15,480 observed intervals). Behaviors were coded as present (1) or absent (0).

Table 4.3 Frequencies of mother behaviors directed towards the infant

		Frequency	Percent			Frequency	Percent
Physical contact				***Mother caregive infant***			
Valid	.0	9111	58.9	Valid	.0	15464	99.9
	1.0	6369	41.1		1.0	16	.1
	Total	15480	100.0	Total	15480		100.0
Hold				***Mother-infant face-to-face interaction***			
Valid	.0	10290	66.5	Valid	.0	15401	99.5
	1.0	5190	33.5		1.0	79	.5
	Total	15480	100.0	Total	15480	100.0	
Proximal				***Mother non-physically soothes infant***			
Valid	.0	8489	54.8	Valid	.0	15455	99.8
	1.0	6991	45.2		1.0	25	.2
	Total	15480	100.0		Total	15480	100.0
Physically soothe				***Mother vocalizes at infant***			
Valid	.0	15401	99.5	Valid	.0	15285	98.7
	1.0	79	.5		1.0	195	1.3
	Total	15480	100.0		Total	15480	100.0
Physical affection				***Mother stimulates/arouses infant***			
Valid	.0	15397	99.5	Valid	.0	15331	99.0
	1.0	83	.5		1.0	149	1.0
	Total	15480	100.0		Total	15480	100.0
Nonphysical affection							
Valid	.0	14973	96.7		Total	15480	100.0
	1.0	507	3.3				

Total number of observed intervals per participant = 540 (540 x 29 = 15,660 total intervals observed; however, some participants had missing intervals, so there is a total of 15,480 observed intervals). Behaviors were coded as present (1) or absent (0).

Table 4.4 Principal-components analysis (PCA) loadings[a] for infant behaviors (high loadings in boldface)

Variable	Component 1 Positive M-I interact 23.96% of the variance	Component 2 Attachment behaviors 17.95% of variance	Component 3 Infant distress 13.16% of variance
Smile	**.889**	-.123	-.022
Laugh	**.757**	-.052	-.040
Responds	**.754**	.327	-.023
Play	**.654**	.033	-.024
Gesture	**.649**	.006	-.017
Proffer	-.080	**.883**	.090
Crawl in lap	-.112	**.874**	-.071
Reach	.376	**.684**	-.062
Fuss	.023	.026	**.922**
Cry	-.100	-.052	**.911**

n = 29
[a] PCA components obtained after varimax rotation.

Table 4.5 Principal-components analysis (PCA) loadings[a] for mothering behaviors (high loadings in boldface)

Variable	Component 1 Maternal proximal soothe 24.67% of the variance	Component 2 Maternal affection 18.98% of variance	Component 3 Mother stim/caregive 18.64% of variance
Physical contact	**.935**	.204	.095
Hold	**.933**	.160	.074
Proximal	**.899**	.163	.058
Physical soothe	**.525**	-.254	.102
Physical affection	.152	**.877**	.223
Nonphysical affection	-.181	**.823**	.230
Face-to-face	.371	**.780**	.050
Nonphysical soothe	.230	-.102	**.854**
Vocalize	.094	.349	**.842**
Stimulate/arouse	-.045	.077	**.681**
Caregives	.100	.319	**.635**

n = 29
[a] PCA components obtained after varimax rotation.

Table 4.6 Mother and infant characteristics of nonstressed and stressed mothers (*N* = 23)

	Nonstressed (*n* = 10)	Stressed (*n* = 13)	t/χ^2	*p*
Infant's gender, % male	26	17	1.96	0.161
Infant age at interview, months	5.20 (3.00)	5.80 (2.60)	-0.55	0.588
Mother's age at interview, years	23.7 (4.00)	26.20 (3.20)	-1.68	0.130*
SES measure, % cattle	13	17	0.002	0.968
Birth order, % only child	30	4	9.67	0.002
Number of siblings	1.80 (1.30)	3.69 (2.30)	-2.33	0.033
Mother's work level[a]	44% (22%)	51% (21%)	-0.86	0.397

Data are given as mean (standard deviation) unless stated otherwise.
Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.
[a]Percent of total observations that mothers were observed working.
*****Mothers were often unsure of their exact age (no birth records existed at the time that mothers were born) and also appeared hesitant to tell us their age most likely due to the stigma of being of non-childbearing age

Table 4.7 T-test results with mother and infant behaviors (*N* = 23)

	Nonstressed (*n* = 10)		Stressed (*n* = 13)		*t*	*p*
	M	*SD*	*M*	*SD*		
Positive mother-infant inter.	.20	1.37	-.26	.60	1.01	0.336
Infant attachment	.09	0.89	-.33	.29	1.43	0.181
Infant distress	.44	1.42	-.27	.71	1.56	0.216
Maternal proximal soothe	.30	1.09	-.42	.84	1.79	0.109
Maternal affection	.23	1.32	-.29	.56	1.29	0.210
Maternal stimulate/caregive	.23	1.16	-.28	.83	1.22	0.258

Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

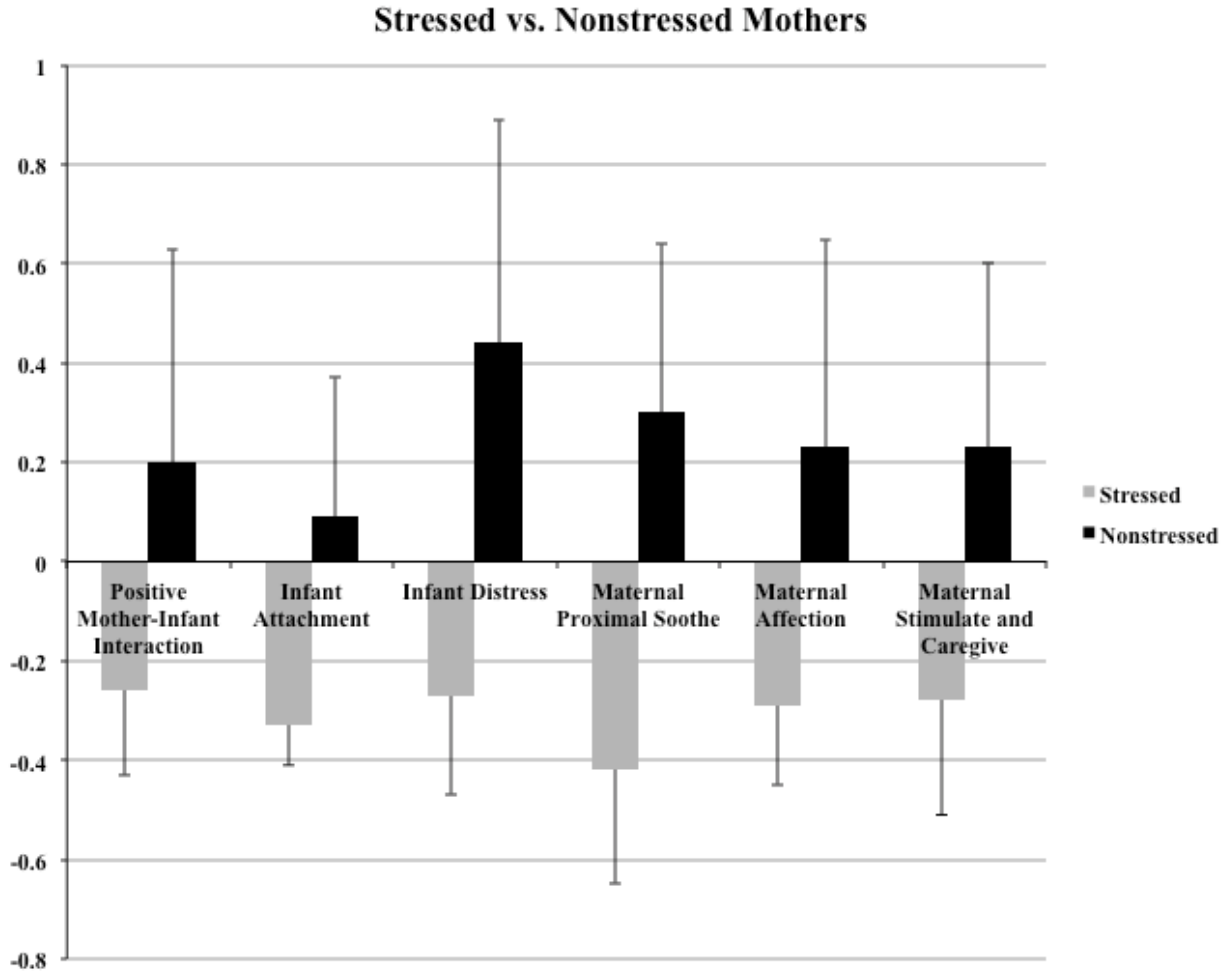

Figure 4.1 Mean differences in mother-infant interactions between stressed and nonstressed mothers

Table 4.8 Regression analysis to predict infant behaviors

Predictor Variables	Dependent Variables					
	Positive Mother-Infant Interaction		Infant Attachment Behaviors		Infant Distress	
	B	95% CI	B	95% CI	B	95% CI
Stressed vs. Nonstressed	0.19	-1.26; 1.16	-0.20	-1.18; 0.45	-0.52	-2.18; 0.60
Infant's gender	0.17	-0.67; 0.10	0.41	-0.12; 0.86	-0.13	-1.66; 1.05
Infant age	**0.19**	**0.06; 0.34**	**0.13**	**0.01; 0.23**	-0.14	-0.37; 0.04
Birth order	1.40	-0.14; 2.81	0.26	-0.81; 1.11	-0.100	-1.37; 1.36
Mother's work level	0.38	-0.08; 0.83	-0.05	-0.38; 0.23	-0.206	-0.86; 0.44
F/*p*	2.88/0.046		2.50/0.071		1.35/0.292	
R^2	0.46		0.42		0.28	

Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

Table 4.9 Regression analysis to predict mother behaviors

Predictor Variables	Dependent Variables					
	Maternal Proximal-Soothe		Maternal Affection		Mother Stimulates & Caregives	
	B	95% CI	B	95% CI	B	95% CI
Stressed vs. Nonstressed	-0.24	-1.13; 0.52	0.26	-0.48; 1.32	-0.25	-1.92; 0.84
Infant's gender	0.08	-0.59; 0.76	0.70	-0.21; 1.76	0.78	-0.09; 1.59
Infant age	-0.08	-0.17; 0.04	-0.03	-0.16; 0.09	-0.11	-0.28; 0.07
Birth order	0.26	-0.51; 1.20	0.96	-0.14; 2.55	0.09	-1.83; 1.22
Mother's work level	-0.65	-0.90; 0.38	0.10	-0.29; 0.60	0.27	-0.24; 0.87
F/*p*	8.85/0.000		1.37/0.284		1.53/0.233	
R^2	0.72		0.29		0.31	

Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

Chapter V

Conclusion

Parents' perceptions of their infants' emotions have been studied across many disciplines, which suggest that an integrated trans-disciplinary approach to this area of research is needed to better understand why parents have the perceptions that they do and how these perceptions are linked to responses to infants. A trans-disciplinary approach that combines the lenses of evolutionary theory, like attachment theory, with investigations into the impact of cultural values on perceptions of infants' emotions and with neurophysiological underpinnings of perceptions will help to provide a greater understanding of this complex aspect of parenting and infant care. Furthermore, cultural underpinnings of parents' perceptions of infant emotions need further investigation. In my systematic literature review, I found that very few studies had looked at the link between cultural values and practices and parents' perceptions of their infants' emotions, and only one study attempted to compare parents' perceptions of their infants' emotions cross-culturally. Furthermore, European American mothers and their infants were over-represented in the literature on parents' perceptions of their infants' emotions. When mothers and infants of other racial/ethnic groups and cultures were included in studies in my systematic literature review, they were often greatly outnumbered by European American mothers. Fathers were also often left out of studies on parents' perceptions of their infants' emotions. These results are not surprising considering that the vast majority of behavioral science research is conducted among Western contexts of parenting and infant care and include mainly European American participants. Thus, generalizations about aspects of parenting and infant care are problematic, especially when applying them to children in non-Western contexts. Two of my studies investigated parenting and infant care among a lesser-studied context of development and

demonstrated patterns in beliefs about infant care and responses to infants that do not completely reflect the findings from Western contexts of child development.

In Chapter 3, I identified the cultural model of Gamo infant emotions and needs in a qualitative study. The findings suggest that mothers' perceptions of their infants' emotions are linked to parenting strategies that reflect the environment in which Gamo infants develop. The main parenting goal of Gamo mothers seems to be focused on helping their infants survive. Thus, mothers predominantly stated that infants needed food and to be held in response to their emotional displays. Furthermore, mothers were responsible for providing much of the food needed to keep infants alive, especially after the age of 6 months when complementary food is necessary. Because mothers had this responsibility but also felt the need to respond to their infants' distress signals, many mothers discussed this conflict. Furthermore, many mothers expressed they were stressed in response to their infants' negative emotional displays. When Gamo mothers were asked about their infants' emotions, they often responded that they did not know what infants were feeling but that they needed basic needs like breastfeeding and holding and that these responses stopped infant fussing and crying and made infants happy. It appeared that Gamo mothers were focused on keeping their infants happy, possibly because infants that did not fuss and cry were considered healthy. This study demonstrates that the primary goal of Gamo mothers is to keep their infants healthy and alive and this perspective aligns with the concerns of other mothers living in economically disadvantaged parts of the world. Furthermore, this type of parenting strategy is very different from parents raising children in industrialized and wealthier contexts. The goal of Gamo mothers, like many parents living in many different environments, is to keep their infants healthy and alive; however, Gamo mothers may be more conscious about the risks to their infants' health and survival and thus focus more time and

energy on helping their infants survive compared to mothers living in environments where the risk of infant mortality is much lower.

The link between mothers' expressions of stress or lack thereof was further investigated in Chapter 4. Mothers' expressions of stress was linked to less mother-infant interactions than mothers who did not express stress. Furthermore, mothers who did not express stress had infants who displayed more fussing and crying for their mothers than infants of mothers who had expressed stress. This could be due to Gamo infants' attempts to maintain maternal care and interaction because nonstressed mothers engaged in more interactions with their infants. Also, the trend in more mother-infant interactions among nonstressed Gamo mothers and their infants aligns with the extant literature on attachment, stress, and parenting. Gamo mothers' expressions of stress in response to infants' negative emotions could be due to beliefs about the link between infant fussing and crying and illness. These beliefs about infant fussing and crying could be a reflection of the ecocultural environment in which Gamo infants develop. This environment includes economic instability and threats to infant health and survival. Gamo mothers' feelings towards their infants' fussing and crying appear to reflect certain aspects of the Gamo ecocultural environment and possibly influences interactions with their infants.

Altogether, this dissertation demonstrates that parents' perceptions of their infants' emotions are multifaceted and are linked to cultural beliefs about infants' emotions and ecosocial constraints of the Gamo infants' environment of development. In other words, Gamo cultural values as well as the physical and social environment are intertwined in mothers' perceptions of their infants' emotions and how mothers respond to their infants. This dissertation exhibits the complexity of this particular aspect of parenting and infant care and parsed apart the various ways that Gamo mothers perceive and care for their infants. Gamo mothers' perceptions of their

infants' emotions can be linked to Gamo cultural beliefs and ecosocial aspects of Gamo infants' environment. An investigation into these different aspects of the Gamo environment is necessary to understand why mothers have certain perceptions about their infants' emotions and why mothers respond to their infants in particular ways. Future studies on perceptions of infant emotions should investigate the link between parents' perceptions of their infants' emotions and multiple aspects of the infants' context of development including cultural beliefs and ecosocial factors. Furthermore, many aspects of Western models of parenting and infant development were not reflected in Gamo patterns of parenting and infant care. Future research should look into parents' perceptions of infants' emotions and subsequent parenting practices among lesser-studied contexts of infant development to inform current developmental theories and address potential universal trends and multiple contexts of infant development.

Vita

Lauren Bader was born to parents Bradley and Debra Bader in Cape Girardeau, Missouri. She obtained a B.A. degree in Biology at Drury University in Springfield, Missouri in 2010. In 2010, she entered the graduate program in Psychology at the University of Tennessee, Knoxville. After obtaining a M.A. degree in Psychology in 2013, she accepted a doctoral position in the Department of Child and Family Studies at the University of Tennessee, Knoxville. In 2017, she graduated with her Ph.D. in Child and Family Studies. She has accepted a Postdoctoral Research Fellowship in Developmental Psychology at the University of Michigan.