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Early supplementary feeding among central African foragers and farmers: A biocultural approach

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ABSTRACT

The World Health Organization (WHO) recommends exclusive breastfeeding (EBF) for six months, yet this recommendation has proven difficult to implement. Here, we examine the nature of and influences on early supplementation (ES) in light of current evidence regarding evolved human caregiving patterns (cooperative breeding). We utilize a biocultural approach, which takes into consideration that infant feeding is influenced by an array of evolutionary, physiological, structural, ecological, and cultural factors. The research is cross-cultural, conducted among the Aka foragers and Ngandu farmers in the Central African Republic. We explore emic perspectives of ES as well as infant characteristics and socioecological factors that, when combined with evidence of human care patterns, offers a more holistic understanding of early infant feeding. We employ a mixed-methods approach, utilizing qualitative interview and quantitative focal-follow behavioral observation data, collected from 2009 to 2012. Results indicate that foragers introduce ES earlier than farmers; nevertheless, only a small proportion of Ngandu mothers EBF. Maternal and non-maternal caregiver ES patterns are predicted by different factors. Maternal ES is associated with infant age, while non-maternal ES is associated with maternal labor activities and the infant's caregiving network. Non-maternal ES, but not maternal ES, reduces breastfeeding. Results suggest that neither subsistence ecology nor maternal labor patterns fully explain the timing of ES. However, cooperative caregiving, infant mortality risk, and cultural models of caregiving offer insights into why foragers commence ES so early. We discuss the implications of ES on weaning age, inter-birth intervals, and fertility. Throughout our evolutionary history and today, non-maternal caregivers were and are essential participants in childcare and provisioning, yet are rarely viewed as active participants in early infant feeding. Consideration of evolved caregiving patterns and the role of others in feeding practice will enhance public health outreach.

Introduction

The World Health Organization recommends exclusive breastfeeding (EBF) for six months, particularly in high-risk environments (WHO, 2003). Cross-culturally, however, mothers do not follow this recommended feeding practice: EBF for six months is uncommon despite health benefits (Dettwyler & Fishman, 1992; Dewey, 2000, 2001; Obermeyer & Castle, 1996; Sellen, 2001a). The introduction of and sustained feeding of non-breast milk liquids and semi-solid foods within the recommended period of EBF, hereafter referred to as early supplementation (ES), has important implications for both infants and mothers. ES is associated with increased infant diarrheal disease and mortality (Black et al., 2008; Brown, Black, de Romaiia, & de Kanashiro, 1989; Lamberti, Walker, Noiman, Victora, & Black, 2011; Popkin et al., 1990). Additionally, ES commences weaning. Not an isolated event, weaning is a process during which infants often gradually transition from solely relying on breast milk to exclusively consuming non-breast milk liquids and foods (Fouts, Hewlett, & Lamb, 2005; Sellen, 2001a). During weaning children reduce nursing frequency, which in turn can affect (although is not the only effect on) the length of maternal lactational amenorrhea, inter-birth intervals, and fertility (e.g., Sellen & Smay, 2001; Simondon, Delaunay, Diallo, Elguero, & Simondon, 2003). Given the implications of ES, research has focused on understanding factors that promote or discourage EBF and influence the timing and frequency of ES. In anthropology, these studies have been undertaken primarily through evolutionary perspectives emphasizing subsistence ecology, demography, and reproductive outcomes, or cultural perspectives emphasizing models of infant feeding and barriers to EBF.

In this study we integrate these perspectives in a biocultural approach (see Fouts, Hewlett, & Lamb, 2012; Gray, 1999) aimed at

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expanding our understanding of ES and its effects on breastfeeding among infants ≤ 6 months. Infant feeding is an inherently biosocial process, influenced by our deep evolutionary history, physiology, social and physical environment, structural considerations, cultural values, and children's development (Fouts et al., 2012; Hinde & Milligan, 2011; McDade & Worthman, 1998). As such, it represents a key area where research will benefit from a complementary and integrated approach (Fouts et al., 2012). We explore cultural modes and contexts of childrearing while placing feeding practice within the framework of our evolutionary history. Specifically, humans are a cooperative breeding species, where non-maternal care and provisioning are ubiquitous and essential for successful childrearing (e.g., Hrdy, 2009). Therefore, a biocultural approach incorporates well-documented structural and cultural barriers while expanding our view of infant feeding decisions and practice outside the confines of the mother-child dyad. We suggest that public health policy aimed at early infant feeding will achieve improved results when outreach targets not only the structural and cultural barriers, but the broader social world in which infant care evolved and is practiced today.

We present results from our cross-cultural investigation into ES in two populations in the Central African Republic—the Aka forest foragers and the Ngandu farmers. A cross-cultural study among foragers and farmers, who reside in the same region, offers a unique opportunity to examine: 1) why foragers despite their seemingly optimal patterns of breastfeeding (multiple short bouts, nighttime feedings, and late weaning) and extensive leisure time (Konner, 2005) are associated with earlier introduction of supplementation (Sellen & Smay, 2001); and 2) why given similar ecological risk, variation in breastfeeding behavior across subsistence ecologies and cultures is prevalent. We highlight emic (insider) viewpoints, a central concept in cultural anthropology, by investigating perceptions and choices regarding ES. Additionally, through detailed behavioral observation data, we examine frequently cited influences—subsistence ecology, maternal work/labor patterns, infant characteristics, and the social and caregiving network—on the timing and frequency of infant feeding. We first offer a brief overview of research foci in evolutionary and cultural approaches to EBF and ES and highlight the evolution and implications of human cooperative breeding on ES. We conclude by discussing the study's implications for understanding the role of ES on age at weaning and variation in fertility rates in hunter-gatherer and agricultural populations. Through this approach, we aim to highlight the multi-faceted nature of early feeding patterns, bridging evolutionary and cultural anthropology.

Evolutionary approaches

Evolutionary approaches have primarily considered the implications of early feeding patterns on child mortality, fertility, and reproductive success. The argument reviewed by Sellen and Smay (2001) suggests that as human populations transitioned into agriculture, access to weaning foods (assumed to be starchy food and animal milk) increased, enabling infants to transition to partial breastfeeding and wean earlier. On average, fertility rates are higher (Sellen & Mace, 1997) and child mortality rates are lower (Sellen & Mace, 1999) among agriculturalists compared with hunter-gatherers. Thus, it is perhaps not surprising that subsistence economies have been linked to the timing of the introduction of liquid and food, and breastfeeding duration. If mothers in agricultural or pastoral societies had increased access to weaning foods, supplementary feeding could commence earlier, which in turn would set in motion the outcomes noted above. However, Sellen and Smay's (2001) results revealed a more complex picture: while hunter-gatherers cease breastfeeding later than agricultural populations and have longer inter-birth intervals, they start supplementation earlier. The authors also found no significant qualitative differences in ES foods across subsistence ecologies, suggesting that agricultural or pastoral economies do not significantly affect the availability of weaning foods. They suggested that variation in early infant feeding patterns and maternal fertility cannot be solely reduced to outcomes of subsistence ecologies and may be better explained through mechanisms such as mortality due to infectious diseases in childhood (see also Gray, 1998, 1999) or maternal energy balance during women's reproductive careers (Sellen & Smay, 2001).

Cultural approaches

Although overlap clearly exists (e.g., Gray, 1998, 1999; Sellen, 2001b), cultural approaches to EBF and ES center more on cultural beliefs or immediate factors that influence maternal decision-making. Frequently referenced barriers to EBF include: 1) beliefs regarding insufficient milk production, resulting in child hunger/thirst (e.g., Davies-Adetugbo & Adetugbo, 1997; Dettwyler & Fisherman, 1992; McCann & Bender, 2005; Otoo, Lartey, & Perez-Escamilla, 2009; Otsuka, Dennis, Tatsuoka, & Jimba, 2008); 2) a lack of social support and/or negative advice from family or peer networks (e.g., Arora, McJunkin, Wehrer, & Kuhn, 2000; Arts et al., 2011; Ingram, Cann, Peacock, & Potter, 2008; Kerr, Dakishoni, Shumba, Msachi, & Chirwa, 2008; Otoo et al., 2009); and 3) maternal labor obligations which limit a woman's ability to EBF (e.g., Dearden et al., 2002; Heinig et al., 2006; Kakute et al., 2005; Nerlove, 1974; Otoo et al., 2009; Sellen, 2001b).

Human cooperative child rearing

The role of shared care in childhood is one area of early infant feeding patterns that has not received critical attention. Although non-maternal caregivers have been highly recognized for their role in influencing maternal-decision making, less attention has been paid to their role in direct infant feeding during the period of EBF. Non-maternal caregivers are often assumed to primarily serve in an advisory capacity (Duong, Binns, & Lee, 2004; Heinig et al., 2006; de Oliveira et al., 2012)—infrequently are others viewed as active feeders for infants ≤6 months. Yet, cross-culturally, humans cooperatively rear children (e.g., Hrdy, 2009; Kramer, 2010) and non-maternal caregivers are active feeders of infants and young children (Fouts & Brookshire, 2009; Gottlieb, 2004; Hewlett & Winn, in press; Levine, 1988).

Beyond ES by non-maternal caregivers, helpers also affect maternal time allocation, influencing mothers' ability to breastfeed. Through provisioning assistance, others enable women to reduce time and energy spent in labor activities (e.g., Hawkes, O'Connell & Blurton Jones, 1997; Hurtado, Hill, Hurtado, & Kaplan, 1992; Meehan, Quinlan, & Malcom, 2013). By donating childcare, others can free mothers to work more frequently and efficiently (Ivey Henry, Morelli & Tronick, 2005). In the former situation, women can remain closer to home and spend more time offering direct childcare (Gurven & Kaplan, 2006), potentially reducing ES. In the latter, if mothers are separated from their infants and others supplement, breast milk may be displaced. Understanding why and under what circumstances non-maternal supplementation occurs and its effects on infants is essential if we are to untangle the myriad factors influencing early feeding patterns.

Study populations

The Aka are mobile foragers who reside in and on the periphery of the Congo Basin rain forest. Camps are comprised of 6–8 huts and average 25–35 people (Hewlett, 1991a). Children are raised in