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Twenty years of biocultural research in Dominica – the Bwa Mawego child stress project

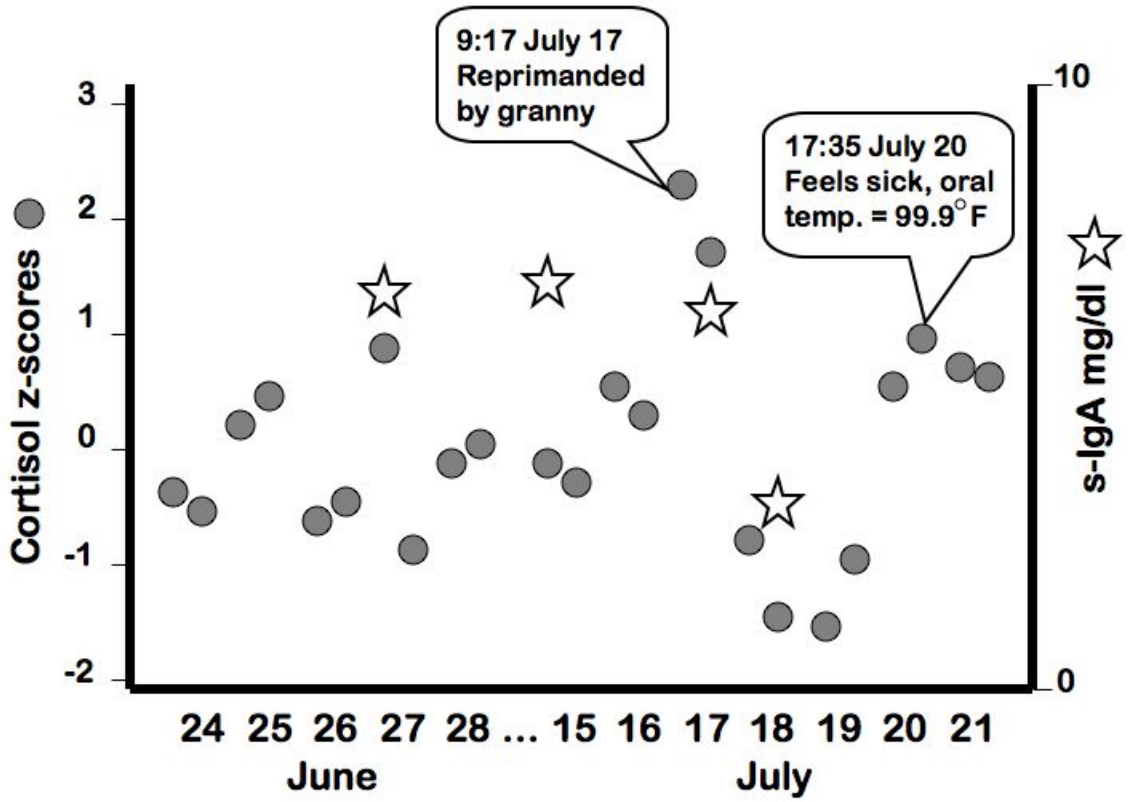
By Mark Flinn, Robert Quinlan, and David Leone.

Recognition of the impact of social conditions on human health has attracted a growing interest among members of the medical and public health community in the mechanisms that link psychosocial stress and medical outcomes. Retrospective and clinical studies, however, have limitations. As a priority article in *Biological Psychiatry* lamented: "What is missing are long term prospective studies that track the nature and timing of early stress exposure and the linkages to children's later stress exposure, HPA [stress hormone] functioning, and behaviors" (Marjorie Essex *et al,* 2002:777).

Hormonal stress response to social events

Wayonne's dirt bomb struck the bright yellow dress hanging on the clothesline, making an impressive star-shaped smudge. His older cousin Jenny turned angrily from sweeping the house yard to chase him with her broom. Granny Deedee's yell halted their squabble. Jenny's face morphed from stifled argument to guilt, head bowed. She later confided to me that she felt upset because granny did not understand; her frustration was compounded by the rule that she must accept granny's authority without disagreement (MVF field notes, July 17, 1994). Jenny's cortisol level, measured from her saliva that we have collected from all children in the community several times a day for several weeks every year for the past 19 years, rose from 1.4 to 4.2 µg/dl. The next day her secretory immunoglobulin-A levels dropped from 6.04 to 3.6 mg/dl. Four days later she had common cold symptoms: runny nose, headache, and low-grade fever (Figure 1).

Figure 1. Changes in the stress hormone cortisol and secretory immunoglobulin-A levels of a young girl in response to a conflict with her grandmother. [figure from Flinn 2006]



This anecdotal case example contributes to a common pattern. Our research on stress and health on children in this rural Dominican community indicates that they are more than twice as likely to become ill during the week following a stressful event than during a week when they had not recently experienced any significant stressors (Flinn & England, 2003).

Understanding how children perceive and respond to their social worlds is important because of the potential consequences for health (including cardiovascular and metabolic problems, cancer, and stress related immuno-suppression – for references see online version). But much of the data required to tease out the links between social stress and child health are not available to clinic-based studies in medical research. Anthropological studies, with an integrated ethnographic and human biological approach, can provide detailed, intimate, real-world data useful for understanding these critical aspects of child development in cultural context.

Key research findings: The importance of family and kin

Analyses of data on children's activities, their reported psychological states, growth, morbidity (illnesses), and salivary cortisol indicate the importance of family and other kin as both a source of and a buffer for psychosocial stress and associated health effects. Grandmothers, for example, can mitigate the potential stresses of a stepfamily

environment for their grandchildren (Flinn & Leone, 2006). Kin effects extend to patterns of breastfeeding duration (Quinlan & Flinn, 2003; Quinlan, Quinlan, & Flinn 2005) and other aspects of parental care.

Current & future research questions

In addition to our core interests in the causes and health consequences of childhood stress, we are pursuing several new areas of research, including relations between stress and reproductive maturity, maternal depression and social support, and factors associated with child resiliency. The extended longitudinal perspective provides new opportunities to examine adult outcomes and multi-generational patterns of family environment, stress, and health. We are also developing collaborative efforts with anthropological colleagues at other sites including Hispanic and Tribal communities in southern Arizona (Kathryn Coe, University of Arizona School of Public Health), and Palestinian refugee camps in Jordan (Ahmed Abu Dalou, Yarmouk University) to develop a broader understanding of the complex links among culture, family, stress, and health.

The success of the Bwa Mawego study has been dependent upon the gracious and involved participation of the community and support from the office of the Chief Medical Officer in the Ministry of Health, Commonwealth of Dominica. More than 40 students and colleagues have contributed immensely to our cooperative research effort. Major funding for this research has come from a series of four senior grants from the National Science Foundation. Over a dozen articles in such journals as *Current Anthropology*, Developmental Review, *Human Nature*, and *Evolution and Human Behavior* have been published so far. Details on grants and citations are included with the column archived on the EAS website.

Contributions to this column are welcomed and may be sent to mshenk@unc.edu. Columns are archived at www.evolutionaryanthropologysociety.org.

Additional Material for the EAS website version:

Major funding sources:

2006-2009 National Science Foundation, BCS-SBE #0640442, “Collaborative research: Early childhood stress, personality & reproductive strategies in a matrifocal community” (Quinlan & Flinn).

2002-2006 National Science Foundation, SBR-0136023, “Genetic conflicts of interest, fluctuating asymmetry, and MHC” (Gangestad, Thornhill, & Flinn).

1992-1996 National Science Foundation, SBR-9205373, "Childhood stress in a rural Caribbean village" (Flinn).

1990-1992 National Science Foundation, BNS-8920569, "Parental care and childhood stress in a rural Caribbean village" (Flinn).

Major publications from Dominica study:

Flinn, M.V. & Nepomnaschy, P. (2007 – in press). Maternal social environment and fetal programming of the HPA stress response. In: The endocrinology of social relationships, P. Gray & P. Ellison (Eds.) (Chapter 16). Cambridge, MA: Harvard University Press.

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Flinn, M.V. & Leone, D.V. (2007 – in press). Alloparental care and the ontogeny of glucocorticoid stress response among stepchildren. In G. Bentley & R. Mace, (Eds.), Alloparental care in human societies. Biosocial Society Symposium Series. Oxford: Berghahn Books.

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