



# Another Way Family Can Get in the Head and Under the Skin: The Neurobiology of Helping the Family

Andrew J. Fuligni<sup>1</sup> and Eva H. Telzer<sup>2</sup>

<sup>1</sup>University of California, Los Angeles and <sup>2</sup>University of Illinois, Urbana-Champaign

**ABSTRACT**—Families can be both challenging and meaningful. Advances in technology have allowed us to gain insight into the impact of family stress on biological and neurological development, but these tools also can be used to understand more deeply the social and cultural meaning of family experiences in the developing child. In this article, we describe a program of research examining the psychological, immunological, and neural correlates of children helping their families. Although difficult at times, such help can provide a sense of belonging and role fulfillment that may shape the neurobiology of the developing child.

**KEYWORDS**—family; neurobiology; immune function

We are at an exciting time in the study of families and children. New tools to view biological mechanisms of development provide an unprecedented opportunity to discover how family experiences get inside the developing child. Scientists studying the impact of early-life stress are making the most of this opportunity. Frameworks such as the risky families model (Repetti,

Taylor, & Seeman, 2002) and the life-history perspective (Worthman, 1993) have generated a growing body of research on how early family stress can alter developing endocrine and immune systems to create an underlying biological risk for chronic adult health conditions (Evans, Kim, Ting, Teshler, & Shannis, 2007; Miller & Chen, 2013; Taylor, Lerner, Sage, Lehman, & Seeman, 2004). Neuroscientists have begun to show how difficult childrearing environments can put the developing brain on different trajectories. For example, early neglectful experiences shape structures such as the amygdala, setting the stage for the development of later mental disorders (Tottenham et al., 2010).

The pioneering efforts of investigators focusing on early-life stress have provided concepts and tools that should enable scientists to study the biological correlates of other, more normative aspects of family experience. In this article, we describe our research on the psychological, immunological, and neural correlates of children helping the family. Although activities such as cooking, cleaning, and taking care of siblings are more common among some sociocultural groups than others, providing some help to the family is a typical aspect of children's lives around the world (Weisner, 2001).

Our work on helping the family provides another example of how to study the interaction between family experience and the underlying biology of development. We have incorporated elements of family stress frameworks, but our approach differs because providing help in families can be a socially and culturally meaningful activity, and may evoke different neural and immunological responses within the developing child. As such, our work suggests avenues for studying more positive aspects of family experience, as well as possible social and cultural variations in that experience.

First, we describe our theoretical approach to studying children's efforts to help their families, which has guided our focus on both challenging and meaningful dimensions of the family. We then summarize findings from our studies of the psychological, immunological, and neural correlates of children helping their families during adolescence and young adulthood. We close by discussing

Andrew J. Fuligni, Departments of Psychiatry, Biobehavioral Sciences and Psychology, University of California, Los Angeles; Eva H. Telzer, Department of Psychology, University of Illinois, Urbana-Champaign.

The authors would like to thank their collaborators for their essential contributions to the studies discussed in this article: Juliene Bower, Elliot T. Berkman, Steve R. Cole, Michael R. Irwin, Lisa Kiang, Matthew D. Lieberman, and Carrie L. Masten. The research was supported by the Russell Sage Foundation and the Cousins Center for Psychoneuroimmunology at the Semel Institute for Neuroscience and Human Behavior, University of California, Los Angeles.

Correspondence concerning this article should be addressed to Andrew J. Fuligni, 760 Westwood Plaza, Box 62, Los Angeles, CA 90024; e-mail: afuligni@ucla.edu.

© 2013 The Authors

Child Development Perspectives © 2013 The Society for Research in Child Development

DOI: 10.1111/cdep.12029

briefly the implications for research on the connections between family experience and the neurobiology of child development.

### A SOCIAL IDENTITY APPROACH TO THE FAMILY

Our work has been guided by an approach that views family membership as a social identity, akin to identities tied to other social groups such as those delineated by workplace, religion, and ethnicity (Fuligni & Flook, 2005). A social identity is “the individual’s knowledge that he belongs to certain groups together with some emotional or value significance to him of his group membership” (Tajfel, 1972, p. 32). The family is rarely considered a social identity; such an approach goes beyond commonly studied family dynamics such as dyadic closeness and conflict to capture the “we-ness” of family experience. Decades of research have shown that group identification can shape both the interactions between group members and the meaning placed on those interactions (Hogg, 2003). Two robust principles about social identification are that social identification is tied to a willingness to voluntarily support the group and a critical source of well-being is a belief that one’s contributions to the group are respected and valued (Hogg, 2003). Assisting the group, therefore, has significant social meaning beyond just the actual acts of helping.

The social identity perspective allows us to consider children’s provision of assistance to the family differently than before. Traditionally, psychologists have emphasized the stressful and negative aspects of children taking on instrumental roles within the family, perhaps because previous research focused on children with parents debilitated by psychological or physical problems. Clearly, engaging in household chores and taking care of younger siblings can be challenging for children. The challenge may be especially salient during adolescence, when children increasingly strive for autonomy. Having to help the family can restrict the time adolescents spend outside the home socializing with peers and engaging in extracurricular activities, two important aspects of teenage life in many societies.

However, despite the challenge, helping the family also can be meaningful, benefiting the developing child even when it is burdensome. In addition to imparting important life skills, helping the family allows children to establish themselves as respected and valued members of the larger family (Fuligni & Flook, 2005); this may be particularly true for cultural groups that emphasize family identity, such as families from Latin America and Asian backgrounds (García Coll & Garrido, 2000). Considering family as a social identity, therefore, pushed us to examine both the challenge and the meaning associated with helping the family at multiple levels of analysis, from the psychological to the biological.

### THE UCLA STUDY OF ADOLESCENTS’ DAILY LIVES

Based on the UCLA Study of Adolescents’ Daily Lives, a multi-wave, longitudinal study of more than 700 teenagers from Asian,

Latin American, and European backgrounds in the Los Angeles area, our work used several methods, including pairing traditional questionnaires with intensive daily checklists in which adolescents reported their events, activities, and mood for a 14-day period. As part of the daily checklist, adolescents indicated whether they had helped their families in any of a number of different ways including cooking, cleaning, caring for siblings, and helping parents at their jobs.

In addition to collecting detailed estimates of teenagers’ assistance over a 2-week period, we examined the daily co-occurrence of that assistance with other aspects of teenager’s lives. Specifically, we measured experiences that were both challenging and meaningful. Participants rated their sense of burden from the family and their daily mood, including feelings of anxiety and depression, as well as their sense of happiness and positivity. Consistent with our social identity approach, we asked adolescents to indicate their feelings of role fulfillment, including whether they felt like a good son or daughter and good brother or sister each day.

Approximately 70 participants came to the lab soon after they turned 18 and provided blood samples through routine venipuncture for assays of health risk, including biomarkers of inflammation. One year later, about 25 of the teenagers had their brains scanned with functional magnetic resonance imaging (fMRI) while engaging in a decision-making task related to family help.

### HELPING THE FAMILY AND PSYCHOLOGICAL WELL-BEING

The daily checklist reports indicated that helping the family is not an uncommon activity (Telzer & Fuligni, 2009). Ninth-grade students provided help to the family on approximately 70% of the days, averaging about 1 hr per day. Chores such as cleaning, cooking, and taking care of siblings were most common (58% and 27% of the days, respectively); helping parents directly occurred less frequently (8% of the days). Teenagers from Asian and Latin American backgrounds helped the family more frequently than those from European backgrounds, but no gender differences emerged.

Not surprisingly, adolescents who spent more time helping the family felt more burdened—they felt they had much work to do at home and many family demands. Strikingly, despite this burden, the teenagers who helped a lot did not experience more psychological distress but instead reported significantly more happiness and positivity on a daily basis.

Consistent with our social identity approach, we examined whether teenagers’ sense of role fulfillment as a family member explained the positive association between helping the family and greater positivity. Indeed, adolescents who spent more time helping the family also felt more like a good child and sibling, which in turn significantly mediated the association between assistance and happiness. Although this pattern was not seen

when teenagers helped parents at their jobs (which was fairly rare and more stressful), the most common forms of family assistance were meaningful and psychologically beneficial despite being burdensome because the activities were a way to become contributing and valued members of the family group.

### HELPING THE FAMILY AND IMMUNE FUNCTION

Although the links among family help, role fulfillment, and happiness are intriguing, adolescents did report that helping parents and siblings was burdensome. Was this burden negative in other ways?

The risky families model (Repetti et al., 2002) and other frameworks suggest that family stress affects long-term health by causing, among other things, frequent activation of the hypothalamic–pituitary–adrenal (HPA) axis. The HPA axis is a fundamental stress-response system, and chronic activation of the axis over time can disrupt homeostatic mechanisms central to long-term health. For example, the glucocorticoids (e.g., cortisol) generated as part of the HPA response are antagonistic to inflammatory responses in the body. Repeated exposure to glucocorticoids, however, is thought to make the body less sensitive and less able to keep levels of inflammation at appropriate levels (Miller, Cohen, & Ritchey, 2002). High levels of inflammation over time have been linked to the emergence of chronic health conditions in adulthood, such as cardiovascular disease and Type II diabetes (Danesh et al., 2000; Hamer & Steptoe, 2009; Lagrand et al., 1999).

We examined whether providing help to one's family in the 12th grade was associated with biomarkers of inflammation from intravenous blood (Fuligni et al., 2009). Teenagers who spent more time helping parents and siblings had greater levels of the soluble interleukin 6 receptor (sIL-6r) and C-reactive protein (CRP), two biomarkers thought to be downstream indicators of exposure to chronically high levels of the pro-inflammatory cytokines interleukin 6 (IL-6). Although similar findings suggesting the biological burden of caregiving have been observed among middle-aged adults (Vitiliano, Zhang, & Scanlan, 2003), seeing these links among a group of healthy 18-year-olds was striking.

After capturing the burden of family assistance, we were curious as to whether the meaningful nature of helping the family also might be evident in the indicators of immune function. Other research has suggested that the social and psychological meaning associated with a stressor could modify the impact of the stressor on biological markers of risk (Bower, Low, Moskowitz, Sepah, & Epel, 2008). We defined meaning as the daily association between helping the family and the sense of being a good child and sibling. Specifically, youths for whom family help was more strongly correlated with role fulfillment attached a greater sense of meaning to helping the family. Even after controlling for amount of time helping the family, teenagers for whom family help was tightly linked to role fulfillment had lower levels of sIL-6r and CRP, suggesting that placing more meaning

on the act of helping the family may be protective. Thus, the immune functioning of adolescents moving into young adulthood reflected both the challenge and the social meaning of helping parents and siblings, consistent with our social identity approach suggesting that certain family experiences have social meaning that affect the developing child.

### HELPING THE FAMILY AND NEURAL FUNCTION

As we considered ways to observe the dynamics of family assistance neurologically, we encountered work on the neural correlates of charitable giving. Neuroeconomists have sought neural evidence for the apparently rewarding nature of charitable giving. Donating money to charities activates the ventral striatum, a brain region associated with reward-related activities, at levels similar to those associated with receiving cash rewards (Harbaugh, Mayr, & Burghart, 2007; Moll et al., 2006).

Adapting the task used by Moll et al. (2006) to make it relevant for providing help to families, we scanned participants' brains in an fMRI machine while they decided to accept or decline a series of financial offers in which the teenagers and their families gained or lost money. In the costly donation condition, participants lost money for their family to gain money, whereas in the noncostly reward condition, they gained money at no loss to the family. The cash payouts were real with money delivered at the end of the study.

Although our sample size was small and results should be considered suggestive, two major findings emerged that point to the value of examining the social and cultural meaning of family experience within the developing brain (Telzer, Masten, Berkman, Lieberman, & Fuligni, 2010). First, our daily-level indicator of the rewarding nature of family assistance (i.e., the daily association between helping the family and role fulfillment) predicted neural activation such that those who experienced greater role fulfillment while helping the family also showed greater neural activation in mesolimbic regions associated with reward (i.e., dorsal striatum, ventral striatum, ventral tegmental area) when making sacrificial donations to the family as compared to receiving cash rewards themselves. Second, Latino youths—who generally place more importance on helping the family—showed either similar or greater activation in these regions when making costly contributions to the family as compared to receiving cash rewards. In contrast, European American youths showed the opposite pattern of greater activation when receiving cash rewards as opposed to donating to the family.

Next, we examined whether we could observe neural activations that would be suggestive of the challenging or difficult nature of family help. Decisions to put the needs of one's family before one's own wishes likely depend on the ability to delay one's own immediate desires and resolve the conflict between personal and prosocial motives, a process involving effortful control. In addition, when making decisions to assist the family, youths need to shift their attention from themselves to think

about their families' needs, values, and goals, a process involving theory of mind and perspective taking.

We examined how family obligation values predicted neural activation in regions involved in self-control and mentalizing when making decisions to help the family. As in our prior analyses, we examined neural activations when teenagers made costly decisions to donate to their family versus noncostly reward decisions. Individuals who placed more value on helping the family, as measured by a questionnaire, showed greater activation in the dorsolateral prefrontal cortex, a region involved in effortful control (Cohen & Lieberman, 2010), and in the right temporal parietal junction and bilateral posterior superior temporal sulcus, neural regions involved in theory of mind and perspective taking (Frith & Frith, 2003; Hare, Camerer, Knoepfle, O'Doherty, & Rangel, 2010; Saxe & Kanwisher, 2003).

Making decisions about helping the family can be difficult, especially when they involve personal sacrifices. Young people must make important decisions that involve putting their family's needs first and delaying personal desires. The involvement of neural regions related to effortful control and social-cognition, along with the activation of the mesolimbic reward system, suggest both the challenging and rewarding nature of helping the family.

## CONCLUSION

Following advances in recent years in our understanding of the impact of family stress on neurobiological development, we can now more deeply understand how the social and cultural meaning of family experiences also becomes instantiated within the developing child. Our research suggests ways in which the dual challenge and meaning of families are manifested as biological endophenotypes. Yet questions remain. In what cases does the meaningfulness of family experiences mediate their apparent impact on the developing child (e.g., assistance and happiness), and in what cases does it moderate the association (e.g., assistance and inflammation)? How is meaningfulness socialized within a family or a cultural group? What is the temporal sequence of the observed biosocial interactions, and what is the role of inherited genetic predispositions toward relevant biological mechanisms and psychological skills (e.g., endocrine and immune response, reward seeking, cognitive control, and mentalizing)?

The tools that allow us to understand how social experience gets inside the developing child will continue to evolve quickly as technology advances. By coupling this technology with existing, rich theoretical approaches to the family, we can understand more deeply how the body and the brain represent both the challenges and the meaning of being part of that fundamental social group called the family.

## REFERENCES

- Bower, J. E., Low, C. A., Moskowitz, J. T., Sepah, S., & Epel, E. (2008). Benefit finding and physical health: Positive psychological changes and enhanced allostasis. *Social and Personality Psychology Compass*, 2, 223–244.
- Cohen, J. R., & Lieberman, M. D. (2010). The common neural basis of exerting self control in multiple domains. In Y. Trope, R. Hassin, & K. N. Ochsner (Eds.), *Self control in society, mind, and brain* (pp. 141–160). New York: Oxford University Press.
- Danesh, J., Whincup, P., Walker, M., Lennon, L., Thomson, A., Appleby, P., et al. (2000). Low grade inflammation and coronary heart disease: Prospective study and updated meta-analyses. *British Medical Journal*, 321, 199–204.
- Evans, G. W., Kim, P., Ting, A. H., Tesher, H. B., & Shannis, D. (2007). Cumulative risk, maternal responsiveness, and allostatic load among young adolescents. *Developmental Psychology*, 43, 341–351.
- Frith, U., & Frith, C. D. (2003). Development and neurophysiology of mentalizing. *Philosophical Transactions of the Royal Society, London B: Biological Sciences*, 358, 459–473.
- Fuligni, A. J., & Flook, L. (2005). A social identity approach to ethnic differences in family relationships during adolescence. In R. Kail (Ed.), *Advances in child development and behavior* (pp. 125–152). New York: Academic Press.
- Fuligni, A. J., Telzer, E. H., Bower, J., Irwin, M. R., Kiang, L., & Cole, S. R. (2009). Daily family assistance and inflammation among adolescents from Latin American and European backgrounds. *Brian, Behavior, and Immunity*, 23, 803–809.
- García Coll, C., & Garrido, M. (2000). Minorities in the United States: Sociocultural context for mental health and developmental psychopathology. In A. J. Sameroff, M. Lewis, & S. M. Miller (Eds.), *Handbook of developmental psychopathology* (2nd ed., pp. 177–195). Dordrecht, Netherlands: Kluwer Academic.
- Hamer, M., & Steptoe, A. (2009). Prospective study of physical fitness, adiposity, and inflammatory markers in healthy middle-aged men and women. *American Journal of Clinical Nutrition*, 89, 85–89.
- Harbaugh, W. T., Mayr, U., & Burghart, D. R. (2007). Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science*, 316, 1622–1625.
- Hare, T. A., Camerer, C. F., Knoepfle, D. T., O'Doherty, J. P., & Rangel, A. (2010). Value computations in the ventral medial prefrontal cortex during charitable decision making incorporate input from regions involved in social cognition. *Journal of Neuroscience*, 30, 583–590.
- Hogg, M. A. (2003). Social identity. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 462–479). New York: Guilford Press.
- Lagrand, W. K., Visser, C. A., Hermens, W. T., Niessen, G. W. M., Vergeugt, R. W. A., Wolbink, G. J., et al. (1999). C-reactive protein as a cardiovascular risk factor: More than an epiphenomenon? *Circulation*, 100, 96–102.
- Miller, G. E., & Chen, E. (2013). The biological residue of childhood poverty. *Child Development Perspectives*. doi:10.1111/cdep.12021
- Miller, G. E., Cohen, S., & Ritchey, A. K. (2002). Chronic psychological stress and the regulation of pro-inflammatory cytokines: A glucocorticoid-resistance model. *Health Psychology*, 21, 531–541.
- Moll, J., Krueger, F., Zahn, R., Pardini, M., de Oliveira-Souza, R., & Grafman, J. (2006). Human fronto-mesolimbic networks guide decisions about charitable donation. *Proceedings of the National Academy of Sciences*, 103, 15623–15628.

- Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*, 330–366.
- Saxe, R., & Kanwisher, N. (2003). People thinking about thinking people: The role of the temporo-parietal junction in “theory of mind.” *NeuroImage, 19*, 1835–1842.
- Tajfel, H. (1972). Social categorization. In S. Moscovici (Ed.), *Introduction a la psychologie sociale* (Vol. 1, pp. 272–302). Paris: Larousse.
- Taylor, S. E., Lerner, J. S., Sage, R. M., Lehman, B. J., & Seeman, T. E. (2004). Early environment, emotions, responses to stress, and health. *Journal of Personality, 72*, 1365–1393.
- Telzer, E. H., & Fuligni, A. J. (2009). Daily family assistance and the psychological well being of adolescents from Latin American, Asian, and European backgrounds. *Developmental Psychology, 45*, 1177–1189.
- Telzer, E. H., Masten, C. L., Berkman, E. T., Lieberman, M. D., & Fuligni, A. J. (2010). Gaining while giving: An fMRI study of the rewards of family assistance. *Social Neuroscience, 5*, 508–515.
- Tottenham, N., Hare, T., Quinn, B., McCarry, T., Nurse, M., Gilhooly, T., et al. (2010). Prolonged institutional rearing is associated with atypically larger amygdala volume and difficulties in emotion regulation. *Developmental Science, 13*, 46–61.
- Vitiliano, P. P., Zhang, J., & Scanlan, J. M. (2003). Is caregiving hazardous to one’s physical health? A meta-analysis. *Psychological Bulletin, 129*, 946–972.
- Weisner, T. S. (2001). Children investing in their families: The importance of child obligation in successful development. In A. J. Fuligni (Ed.), *Family obligation and assistance during adolescence: Contextual variations and developmental implications* (Vol. 94, pp. 77–84). San Francisco: Wiley.
- Worthman, C. M. (1993). Biocultural interactions in human development. In M. E. Pereira & L. A. Fairbanks (Eds.), *Juvenile primates: Life history, development, and behavior* (pp. 339–358). Oxford, UK: Oxford University Press.