

News From The Gunnar Laboratory Spring, 2001



Greetings from Professor Gunnar

During the last year or two, you and your child(ren) helped us with one (or more) of the studies described in this newsletter. This letter is a way of thanking you and keeping you abreast of our results. Our research group studies the social regulation of stress hormones during childhood. Challenge or stress can result in increases in sympathetic activity and increases in cortisol, a stress hormone. These changes help the body and mind manage challenge. We measure sympathetic activity using a component we can sort out from heart rate monitoring. stimulates changes that we can measure using heart rate monitors. We measure cortisol in saliva because a small amount of this blood-borne hormone seeps into our saliva.

Learning to manage stress is

something we all must do. Stress is not necessarily bad. A life without any challenge would be pretty boring. Running away from all challenges might protect children from stress, but it would not prepare them well to handle adult life. Turning on our stress system too often or too intensely, however, may mean that we will suffer physical and emotional problems, especially as we age. How do we meet challenges and learn to manage them without flooding the body with stress? This is the stress dilemma and it is what we

study in the Gunnary Laboratory.

Childcare Quality: Sensitive, responsive, loving care from parents reduces stress in infants and young children. The same is true of care from childcare providers. In previous studies we have found that for 3- to 5-year-olds in full-day childcare, afternoon stress hormone levels were a function of childcare quality. As quality of childcare decreased, afternoon cortisol levels increased. In a study conducted by Sarah Lane (undergraduate) and Jan Alwin (graduate student) we have now extended these findings to toddlers (18 to 36 months). Toddlers had higher cortisol levels in the afternoon when they were at a Center that scored lower in quality than when they attended a Center that scored higher in quality. For infants, we did not detect an effect of childcare quality, but this may be because (at the time we conducted the study) the tools available to assess quality were not specifically designed for infants.

Childcare and Problem Behavior. A major study of childcare just reported that longer hours in childcare were associated with more difficult, aggressive, problem behavior in children. You may have read about these findings as they were all over the news back in April. We don't know if our childcare- stress hormone data helps explain these findings, but they might. We

suspect this because in all our studies of stress hormones and childcare, children with more negative, difficult, and aggressive behavior show more of the childcare-cortisol effects. Fussy, irritable, easily frustrated, aggressive children appear to have the highest stress hormone levels as the daycare day proceeds. Their levels are the highest and the most likely to increase as childcare quality decreases. We have seen this at all ages, from infancy through the early school years. What we don't know is whether their higher stress hormone levels are causing these children to be more difficult, or whether more irritable, difficult, and aggressive children create more stressful environments for themselves (and others). We have just been funded by the National Institute of Mental Health to try and answer this "direction of effect" question by following children over time in higher and lower quality childcare settings and observing changes in children's emotions and behavior.



What happens when children do not receive loving care early in life? In

the last few years we have become involved in studies of children reared in orphanages for their first months and years of life. What we are trying to find out is whether such early experiences change the way our stress system functions or how children use adults as sources of safety, support, and help.

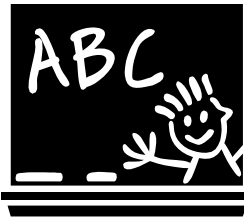
One effect of lacking close, loving caregivers early in life may be that children lag behind in understanding that other people had "minds of their own".

Understanding that others have an "inner mental life" and learning how to think about what others are thinking are some of the major tasks of early childhood. We call this developing a "theory of mind".

Theory of mind (TOM) develops rapidly from late infancy through the toddler and preschool years. For example, if you see something interesting and say "look at that!" while you point at something, a 6-month-old is more likely to look at you than at what you are pointing at. But, by 12-months or so, the baby will look at what you are pointing at. A little later, if you suddenly look to your left and say "oh my!", the child will know that you see something over there and will look where you are looking. Toddlers also frequently look to parents and caregivers to see how they are reacting when something happens that they don't understand. The toddler is developing an understanding that you have a 'mind of your own' and that what you are thinking, feeling, or seeing can be different from what he or she is thinking or feeling, and that others are important sources of knowledge about the world. We have many simple tasks that we can use to figure out what infants and toddlers "know" about the inner lives of the other people around them. Many of these tasks can be used with children who do not yet have language skills.

During the last year we have been conducting a study of children adopted from other countries. This study is being done by Maria Kroupina (graduate student) in collaboration with Dana Johnson, M.D. in the International Adoption Clinic at the medical school. Infants and toddlers are

tested on these tasks when they first arrive in their new families and then 6 months later. At the second test session we also examine the children for their general developmental level, using the Bailey Test of Mental and Motor Development, along with several more specific tests of cognitive and social abilities. We are just beginning to see the children for the second round of testing, so we do not yet have results to share with families. However, we are hopeful that our TOM measures may provide an early index of whether children with more deprived backgrounds need some extra support in learning to use their parents and others as sources of information about the world in ways that will help support their cognitive and social development.



International Adoption Survey: As part of our efforts to understand the development of children adopted internationally, we have been funded by the National Institutes of Health to conduct the first major survey of the health and well-being of internationally adopted children in the U.S. In February, working with the Department of Health's Adoption Unit, we mailed surveys to families of nearly 4,000 internationally children adopted into Minnesota between 1990 and 1998. The children in the survey represent the broad range of international adoption. Many were adopted early, having experienced foster or family care prior to adoption. However, a good number of the children were adopted after many months in orphanages around the world. The survey covers experiences pre-adoption, the families' experience of

the adoption process, the children's health at adoption and currently, behavioral development and behavior problems, children's experiences at school, and issues of racism that some of these children and families must learn to negotiate. In addition to our research group, the survey reflects the work of the International Adoption Clinic, the Family Social Science Department, and the School of Public Health. The survey, called the International Adoption Project (IAP), has also benefited from the input and support of a very active group of parents on our Parent Board of Advisors.

At last count, we had surveys back from approximately 50% of the families. Over the next months we will be sending reminder letters and "replacement" surveys to increase the percentage of families participating. The usefulness of the survey, of course, depends on a high return rate. Our summer will be filled with preparing the survey to be coded and analyzed. We hope to have the first set of findings available to families by early in 2002.

If you want more information on the survey, please see our website: <http://icd.coled.umn.edu/IAP> or call us at 612-624-0321.

Self-Regulation and Stress: When our children are babies and toddlers, our loving care buffers them from turning on their stress systems. But, what happens when they are older and more independent? As children get older they get better at controlling their emotions. The emotional lability of infancy and early childhood gradually gives way to more emotional control. Researchers believe that the development of self-control reflects the development of the frontal lobes of the brain.

In several studies we have found that more impulsive children (according to parent report) score lower on frontal lobe tasks and this seems to correspond to larger stress hormone responses to new situations and more behavior problems.

To get “closer to the brain” in a recent study Elysia Davis and Jackie Bruce, graduate students in our research group, conducted a study that examined the pattern of brain activity produced while children performed these frontal lobe tasks. This study was done in collaboration with the developmental neuroscience laboratory of Professor Charles Nelson. The children who were 6-years-old showed increased activity over the parietal, not over the frontal lobes, when they were trying to perform these tasks. **Elysia and Jackie, can you give me an interpretation????**



Stress and Shyness

For shy children, new social situations can be very difficult. For this reason, most researchers expect that shy children will rev up their stress system when they enter new social groups. Jerome Kagan at Harvard University has shown that extremely shy children have faster heart rates when they are in new social situations than do non-shy children. But, we have looked in one study after another and we find little evidence that, in the middle range, shyness is associated with higher stress hormone levels.

As a stronger test of the relationship between shyness and stress, Nim

Tottenham, a graduate student in our research group, recently studied 9-year-old girls in a test of their reactions to a task called the “Trier Social Stress Test”. In this test children perform very difficult mental arithmetic outloud and give a short speech in front of a panel of judges while they are being videotaped.

During this challenging task, we measured the girls’ sympathetic nervous system activity by measuring particular aspects of their heart rate and we took saliva samples to examine stress hormone levels.

Once again we found that it was the more exuberant, outgoing girls and not the shy girls who were more “stress reactive”. Socially outgoing girls increased their stress hormone production from home to laboratory and had higher sympathetic nervous system activity when they arrived in the laboratory for testing. Their pattern of stress activity suggested that they were “getting up” for the challenge of the task more than were the shy children.

This pattern of results was opposite of what we expected to find. But, they were consistent with many of the other findings from our research group. Overall, these findings point out the problem with always thinking “stress” is bad. Increasing our stress levels a bit is part of meeting the challenges of life. The outgoing girls did not continue to show rising stress hormone and sympathetic activity during the stress test. In fact, their stress levels fell off as the test proceeded. What they did show was a preparatory response of their stress system that, perhaps, allowed them to be ready to meet the challenges of the testing situation.

Evening Activities and Stress Hormone Levels at Bedtime

Our stress hormone levels follow a natural diurnal or day-night pattern. When we wake up in the morning they are at a high level that prepares us to meet the day. Over the day they fall until around bedtime we have almost no stress hormones in circulation. If these hormones are given near bedtime (as can be done in experiments with adults), they make it harder for us to fall asleep and they disrupt the normal pattern of brain electrical activity during the nighttime.

Stress hormones, of course, are also reactive to the events of our lives. The lifestyles of children have changed over the last 25 years. Afterschool activities used to be held primarily in the afternoon hours, and children were typically at home or in their neighborhoods in the hours between dinner and bedtime. Now, for many children, evening hours are taken up with such things as scouting, music lessons, and sports practice. Even when they are home in the evenings, many children spend hours playing emotionally-intense videogames. Do these evening activities influence the levels of stress hormones in circulation near bedtime and, if so, does this seem to affect how easily some children fall asleep?

To begin to answer this question, two graduate students in our group, Susan Hickman and Darlene Kertes, have been recruiting parents to record the evening activities of their school-age children and to collect saliva samples on several nights just before the children go to bed. In each family, parents are helped to select two evening when the children are home from dinner onward, and two when they have scheduled activities. Parents also report on the children's sleep on each night of testing and complete questionnaires describing the children's behavior and emotionality. So far, about 75% of the families have

completed the study. By the next newsletter we should be able to tell you whether and for which type of children evening activities may be raising bedtime stress levels and whether this seems to be affecting these children's nighttime sleep patterns.



Thanks from All of Us:

It takes many staff and graduate students to conduct all these studies. For the students the work comprises their masters and doctoral thesis research. It also takes the help of research assistants and undergraduate students (too numerous to name). They all would like to thank you and your children, without whom we could not even begin. Thanks from: Jackie Bruce, Elysia Davis, Maria Kroupina, Nim Tottenham, Susan Hickman, Darlene Kertes, Bonny Donzella, Nikki Madsen, Niki Wenzler, and Meg Bale. And, my special thanks to you as well.

Professor Megan Gunnar

If you would like to contact us, please write to The Gunnar Lab, 51 East River Rd, Institute of Child Development, University of Minnesota. Call us at 612-624-0321 or e-mail at Gunnar@tc.umn.edu.

You may also add your name to the list of families willing to participate in research by contacting us.