

Institute of Child Development's Human Developmental Psychobiology Lab

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Greetings from Prof. Gunnar

During the last year, parents, children and child care providers 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. Many of the studies you have participated in over the last year are not complete and thus this newsletter is mostly a progress report rather than a final report. We will send out another newsletter next year with many more results. In addition you will receive a report specific to the study in which you participated when it becomes available. We would like to thank all of you for your willingness to participate in research.



The Big Picture

Although as parents and teachers we try to shield children from overwhelming stress, we also want them to learn how to manage the normal stresses and challenges of life. Life is full of stresses of different types. In some ways stress is good. A life without any stress would certainly be boring. But we also know that stress contributes to poor health, emotional problems, and early death. Some people manage stress better than others. These people deal with the major life stresses well (losing a job, death of a loved one) and they also manage the daily hassles of life without becoming worn out, sick, or depressed. Many researchers believe that the seeds of our ability to manage stress as adults are sown in childhood through the interaction of our genes with our experiences. In our research we try to understand how the experiences of childhood affect children of different emotional temperaments and how the combination of temperament and experience shapes a child's ability to manage stress as she or he grows up. The many different studies you will read about in this newsletter all approach our "big picture" question in one way or another. Most of the studies are on-going. This means that we will provide you with progress reports rather than final results in this newsletter.

Children's Behavioral Styles: a progress report

Some children are shy, others are bold. Some can't tolerate frustration, others can. Both shy children and those who have difficulty tolerating frustration may also have more trouble managing the every day stresses and hassles of childhood. But, is this because they have more reactive stress systems? This is the question we are trying to answer in what we call our Behavioral Styles study.

In this study we ask parents and children to come to the University to play a number of games. The games are meant to bring out differences among the children in shyness/boldness and frustration tolerance. If you have come in to help with this study, you know the types of games your child played. For example, as one way of seeing how bold or shy children are, we allow them to play in a "Risk Room" that has a number of exciting things to do. They can climb a set of stairs and jump onto a mattress, crawl through a tunnel, and explore a rubber gorilla mask. In another game we ask children to put a fun toy in a plastic box, lock the box and then give the child a set of keys to use to open it. This game is frustrating because, at first, the child is given the wrong set of keys. Only after a few minutes does the researcher "realize" her mistake and give the child the set that does open the box.

Because every child will sometimes be shy and sometimes get really upset when frustrated, we can't be sure that every child's reaction to our games reflects how they typically act. For that reason, we also ask parents to fill out a questionnaire describing their child's typical reactions.

Behavioral Styles continued from front page

To examine children's physiological stress reactivity, at one point during the session we pretend with the children that they are astronauts. As part of that game we measure the children's heart rate, eye-blink startle, and cortisol stress hormone reactions as they watch several short film clips, one neutral (about the planets), one happy (Winnie the Pooh), and one slightly scary (Land Before Time).

So, what have we found so far? We began seeing children in this study a year ago in the fall of 2002. So far, we have seen 25 children who are also taking part in our preschool study (see Peer Relations Project on page 3) and 50 children who are also taking part in our child care study (see Family Child Care Project on page 4). We hope to see about 150 children before this study is completed, so we are about half way through. We are very grateful to the children and their parents for all their help and we continue to enroll new families in this study every week! We are happy little scientists, with children in our hallways and our computers overflowing with data. It is too early for us to address our big questions in this study so stay tuned for results in our next annual newsletter when we should have many more results to share with you. If you have any further questions about this study please contact Bonny Donzella (donze001@umn.edu, 612-624-4351) or visit our website at <http://education.umn.edu/icd/Styles>

Let's Test out that Idea!

Before setting sail on the Behavioral Style Study described above, we had about 40 children and their families help us with a smaller, shorter version of the Styles study. In a pilot study, we asked families to come in for two sessions where we looked at children's physical responses to emotional films and their behavioral responses to our tasks. This study helped us refine our measures, and prepared us for our current on-going collection. Unlike our current study, we did not visit these children at child care or preschool. Here are a few findings from this preliminary research.

First, we found that the "Risk Room" does elicit both shy and bold behavior. Risk room behavior changes over time, but mostly for the shyer children. Kids who explored without hesitation at Time 1 also did so at Time 2. Kids who were hesitant at Time 1 though, became less so at Time 2.

Second, the behavior we see in the lab corresponds to what you told us about your children in the questionnaires. This is interesting because some researchers believe that parents have very biased views of their children. These researchers don't believe that you can get accurate information from parents and that you only can really study children by observing them yourself. We don't believe this. In fact we think that parents are important collaborators in our attempts to understand children. To check on our view of parents, we compared how parents described their children's behavior on the questionnaire they filled out with how the children acted during our games. Specifically, we compared how parents scored their children on shyness and how we scored the children in the risk room (the game where the children got to explore the gorilla mask and so on). The parent report and our observations of the children were in close agreement. For example, the children who were reluctant to jump from the stairs or touch the mask in the "Risk Room" also tended to be hesitant toward new people or things in their daily world. The kids who readily explored the room (and even wore the mask!) tended to be those who you reported were bold and outgoing in their everyday interactions. We also seem to be seeing that less bold children are more physiologically stress reactive. Perhaps especially interesting to parents, the parent report measures of children's shyness and boldness were at least as good, and perhaps a bit better at predicting children's physiological reactions than were our observational measures in the risk room!



Third and interestingly, we found that Cortisol, a stress-sensitive hormone, is *lower* in the lab than at home. We have seen this many times in this age group, and we do not have a clear explanation for it. We do not believe that kids are more "stressed" at home. Instead, this may be a normative reaction when facing an unknown situation in the company of a reassuring parent. This explanation requires further testing.

Next, we were able to demonstrate emotion-related changes in "startle response" in this age group, which had not been attempted before. Kids show bigger eye-blinks during the scary movie and smaller blinks to the happy movie, compared to their blinks during the neutral space movie. This technique gives us a way to look at emotion responses in an age group who cannot readily self-report their emotions.

Peer Relations Project

The Peer Relations Project just completed its second year in the Shirley G. Moore Laboratory School. In this project, we are trying to understand how children's temperaments and sensitivity to stress influence the way they negotiate relationships with other children. During the preschool years, children develop friendships and being liked becomes important. The Peer Relations Project is designed to help us and preschool teachers understand how the social challenges of the classroom may translate into mild stress for children with sensitive temperaments so that we may know how best to support their healthy development.

Children in the preschool identify our project with our puppet mascot "Mo the Monkey." Mo helps us invite children to attend fun events including a carnival, a jungle party, and a scavenger hunt. To examine assertiveness, Mo has the children line up to get tickets for these events. Every child gets to go of course, but those who get the first tickets go first. The children seem to love Mo's events. As part of this project we also invite children to play the "Picture Game" and the "Tasting Game." In the "Picture Game," children look at photographs of their classmates and point out their circle of friends at school. Playing the "Tasting Game" gives us our measure of the hormone cortisol that increases when children attempt to handle mild stress and challenge. To play the tasting game the children taste a few grains of sweetened Kool-Aid crystals and then hold a dental cotton role in their mouths to absorb saliva. When the whole project is done we will have these saliva samples analyzed for cortisol. We also observe children's social interactions in the classroom, gym, and outside. Lastly, the preschool teachers complete a set of questionnaires seeking information about temperament, friendship qualities, and the social skills of the children in their classrooms. Because this whole project won't be over until 2006, we can only describe some very preliminary findings.



Playing with others presents children with a fundamental problem. How do they get what they want while still making and keeping friends? If they grab, push, or coerce other children, they may get what they want, but not have many friends. If they are always deferential to other children, they may avoid being disliked, but not get what they want. Part of what children learn in preschool is how to get their needs met while still being a good friend to other children. However, children differ in temperament and this may affect how they go about managing this fundamental challenge of peer relationships.

In the preschool, we found that as children get older and have more social experience they balance this conflict more easily. Older children have larger circles of friends. Among these children, those who get their way more have more friends. Younger children have smaller circles of friends. Among these children, those who get their way have fewer friends. Among younger children, being aggressive and impulsive is associated with getting one's way, but it interferes with being well liked. This isn't true for the older children. Among the older children, being a bit aggressive still goes along with getting one's way, but it doesn't seem to interfere with being popular with other children. This probably means that more assertive older children are using more socially acceptable assertive skills.

For both older and younger children, however, being shy and anxious is associated with having fewer friends and being less likely to get what you want. In some settings, teachers focus more attention on the more rambunctious children and they miss the needs of the more shy, anxious ones. However, teachers in the Shirley G. Moore School spent more time with shy/anxious children and shy. This may be one of the reason why anxious behavior in the classroom decreased with age.



Family Child Care Research Project

For the majority of young children in the United States, child care is where much of early development takes place. Child care is the setting in which most children first learn to interact with other children on a regular basis, establish relationships with adults other than their parents, and learn skills such as sharing, waiting and working together. Not surprisingly, many of these experiences can be challenging for some young children.

The Family Child Care Research Project (FCP) seeks to develop an understanding of how children with different temperaments and emotional needs adapt to the challenges of child care. Having previously investigated this question for children in center-based child care, we now hope to expand our knowledge to children in family-based child care settings.

The Family Child Care Research Project began in the fall of 2002. Children who enroll in the FCP are observed at their child care setting on 2 separate occasions and visit our study site at the University of Minnesota with their parent(s) 2 times, over a span of about 6 months. Thus far, 53 children have started the project, with 19 completing the entire sequence and 25 on their way to completion. A substantial part of the past year was also spent developing and maintaining contacts with family child care providers in the Twin City Metropolitan area. To date, over 425 family child care providers have expressed interest in participating in child care research!

The FCP will continue to enroll new children in the project well into 2005. If you are interested in having your child participate in the FCP, or would like more information about the project, please contact Erin Ahern at (612) 624-0321.

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Some children who participated in the Peer Relations Project this past year also agreed to participate in the Children's Behavioral Styles Study. This study allows us to closely assess children's temperament and some of the physiological contributions to how they manage social interactions with peers. Checking our very preliminary findings from this year, as we expected there may be a physiological reason that some children opt to avoid mildly stressful challenges in the preschool. Specifically, it seems that children who have calmer nervous systems (their bodies react less to challenging situations) are less shy and more assertive with peers. Preschool families returning to the lab school who were unable to participate in the Styles Study this past year will have another opportunity during the upcoming school year. You can read more about this study elsewhere in this newsletter.

The Peer Relations Project will continue through the spring of 2005. For more information about this project, please check out our website at <http://education.umn.edu/icd/PRP/> or contact Shanna Mliner, project coordinator, at 612-626-8949.

Let's Test out that Idea!

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Lastly, we did find some indications that children's behavioral style and physiology are related, but as is typical, this link is not strong. However, we found very high stability of physiology over the two months between sessions. Children's heart rate at Time 1 was very similar to their heart rate at Time 2. In addition, we saw the expected pattern of heart rate changes in children's responses to the films; heart rates increased during the scary film, and decreased when watching the happy film.

We look forward to bringing you further information on these same topics with the completion of the Behavioral Style Study. If you have any further questions about this study please contact Bonny Donzella, donze001@umn.edu, 612-624-4351 for further information.

Daytime Cortisol Rhythm in International Adopted Children:

In a recent study, the International Adoption Project (IAP) staff, an interdisciplinary group of researchers looking at issues regarding children who have come to their families through international adoption, worked with a group of over 200 seven to eleven year olds to study the daily cycle of their cortisol. Cortisol is often called a “stress” hormone, but it is also produced every day on a daily or diurnal cycle to support healthy functioning. For the normal daily cycle, cortisol is at its highest levels around the time we wake up, and its lowest levels around the time we go to sleep at night. There is some evidence in studies of animals that early experiences set the tone for this daily cycle. When early experiences have been challenging or stressful, the system is “toned up” to produce higher levels of the hormone and to react more strongly to new challenges. Because some internationally adopted children experience neglect and other stressful experiences before adoption, we wanted to see whether this would raise their daily cortisol levels several years after adoption.

We measure cortisol in small samples of saliva. In this study, the children collected their saliva by chewing on a piece of gum and then spitting through a straw into a vial. The children spat for us twice a day, once after waking up and once before bedtime. They did this for 3 days and then mailed the samples to us. Their parents helped by filling out questionnaires and keeping tabs on their child’s progress. Children completing this study earned gift certificates to Target.

We found that the vast majority of children showed higher cortisol levels in the morning than the evening, which follows a normal daytime pattern. Children who received poor or very poor care prior to adoption had slightly higher cortisol levels in the morning soon after waking up. These levels, however, were still well within the normal range. We also found that children who were more growth delayed at adoption had higher wake up levels of this hormone. Of course, the children who were more poorly cared for before adoption were also the ones who were more growth delayed. Why are our cortisol levels high around the time we wake up? Early morning cortisol levels help to stimulate our interest in carbohydrates and in exploring our environments in search of food. Although all of the children now live in homes with plenty of nutritious things to eat, the children who were more growth delayed at adoption still reveal this slight signature of their early privation. For some of the girls there was also another signature of their early experiences. Those girls who were more growth delayed at adoption were also beginning to show signs of pubertal development earlier than girls who were less growth delayed. Other researchers have also noted this phenomenon. Although the type of pre-adoptive care children received was related to their height and weight at adoption as well as to growth following adoption, it was not related to children’s current weight or height.

As part of this study, we also asked parents to describe their children’s behavior and emotional reactions. When we looked at whether early experiences and cortisol were related to current behavioral adjustment, we found several things. Children’s emotional reactions and behavior were not related to their cortisol levels. However, children who experienced poor care prior to adoption were having more trouble controlling their emotions, regulating their attention, and getting to bed and to sleep. We will be continuing to study how the experiences of children prior to adoption influence such basic processes as daily cortisol rhythms and sleep in order help parents to understand and support the healthy development of their children. If you would like more information about this study please contact Darlene Kertes at kerte001@umn.edu or IAP at 612-624-9322.



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Research Opportunity:

Family Child Care Research Project: We are continuing to recruit both family child care providers and parents to participate in the Family Child Care Research Project (FCP) and will continue to recruit through 2005. Children need to be 3 1/2 years old and in child care for at least 30 hours per week. Children who enroll in the FCP will be observed at their child care setting on 2 separate occasions and visit our study site, at the University of Minnesota, with their parent(s) 2 times. Both parents and child care providers will be compensated up to \$100 for their participation in this research project.

The Family Child Care Research Project will also begin examining toddler's behavior in family based child care settings beginning in 2004. This project entails only 1 observation in the child care home and children do not have to visit the study site. Again, both parents and child care providers will be compensated for their participation in the research.

If you are interested in having your child participate in the FCP or would like more information about the project, please contact Erin Ahern at (612) 624-0321. You are also invited to visit our website at <http://www.education.umn.edu/icd/FCP> to learn more about the project.