



INTERNATIONAL ADOPTION PROJECT

Summer 2014

Greetings from Professor Megan Gunnar



Thank you to all the families who have participated in our research at the University of Minnesota.

The Minnesota International Adoption Project (MnIAP) was inspired in the mid-1990's by the needs of pediatricians in the International Adoption Clinic at the University of Minnesota Hospitals and Clinics. They came to researchers in child development with requests for help in addressing behavioral concerns expressed by families who had adopted children from institutional care overseas. When we started the MnIAP we received funding from the National Institutes of Health (NIH) to survey all families who adopted through Minnesota adoption agencies between 1990 and 1998. That initial survey showed us that we had a large group of families to study and that while most of the children were doing fine, there were certainly many who were having problems of one sort or another.

So we establish a registry of families who were interested in helping us with our research, then received another grant from the NIH to study the neurocognitive development of internationally adopted children. More grants were to follow. In fact, since 1999, the NIH has provided the MnIAP with five grants totaling over \$5

million. We are very grateful for their support. We have learned a great deal and have shared that knowledge with our families, with the International Adoption Clinic and other pediatricians throughout the country, with adoption professionals in our state and elsewhere, and with psychologists in clinical practice seeing children adopted internationally. We have also published our results. If you are interested, there is a full list of our publications on the IAP website under publications. Nearly all are available on PubMed Central, which you can access via Google search. Click on the first link that comes up (Home PubMed NCBI), then type Gunnar MR in the search bar and voila, many papers will appear. You can download a PDF free of charge. If that doesn't work, just contact the MnIAP and we will send it to you.

For those of you who do not want to read journal articles, we provide these newsletters to keep you up to date on our findings. Past newsletters are available on the MnIAP website.

Thanks for all you do to make this work possible!

—*Regents Professor Megan Gunnar
& the Minnesota International
Adoption Project Team*

Update from the Self-Control Study

By Jamie Lawler and Elisa Esposito

Everyone has days when they get so frustrated with a problem that they want to give up. Or they can't stop themselves from doing something they know they shouldn't, like eating that second piece of cake. Self-control is a crucial requirement for navigating every-day life. A major task of childhood is acquiring self-control—learning to control impulses, emotions, and attention. Deprivation and disruption of relationships early in life has long-lasting impacts on the brain regions underlying self-control. Many internationally adopted children struggle to regulate their attention, behavior, and emotions.

The International Adoption Project has studied the development of attention, emotion, and behavior regulation for many years. Two years ago we decided it was time to try to develop interventions to improve self-regulation in internationally adopted children.

The Self-Control Study tried two types of interventions: mindfulness training and executive function training. In mindfulness training we sought to develop children's self-regulation skills by making them more aware of their senses, feelings, and actions, and teaching ways to feel calm. In executive function training we sought to give children direct practice in "stopping their bodies" (controlling impulses), paying attention, remembering information, and thinking creatively.



Both types of training were designed to be delivered in small classes over a six-week period of two one-hour long sessions per week in the summer. Before and after their six weeks of class series we had the children do a number of tasks that assessed self-regulatory skills and social competence. A comparison group of children also completed these tasks at the beginning and end of the summer, but attended no classes. (These children have the opportunity to come back this summer and take part in the classes without being tested.) We had the parents of all the children in the study complete questionnaires on their child's behavior and ask their child's teacher to complete a questionnaire during the school year.

As you can imagine, this is a complicated study to run and we can only provide classes for so many children in one summer so we are running the study in waves. We have run for two summers now and have one more to go.

Because this study is still underway, we cannot write about what we have found so far as it might bias the children and parents who will be part of this summer's classes. However, if your child was a participant in the study in the last two summers, you should have just gotten a letter detailing our findings to date. We are pretty excited by them, but some are just "almost" statistically significant, which is why we need one more summer of data collection.

Do Early Life Experiences Change the Way Genes Function?

By Elisa Esposito and Jena Doom

We know from the research all of you have helped us complete that early life experiences can have a long lasting effect on behavior. Why is that? One possible answer lies in EPIGENETICS. We know that each cell in our body has the same genes, which is why we can take a cheek swab and analyze our genetic code. But if the genes acted the same way in all our cells, then all our cells would be alike, and clearly that isn't true. From the time of conception, when we are just one cell, to the time of birth our cells differentiate and the genes in each type of cell get programmed so that they become the genes that make a heart cell different from a liver cell different from a brain cell and so on. We used to think that this genetic programming ended at birth, except when genes became impaired and caused cells to go wild, as in cancer. But science has now shown that this isn't true. Experiences after birth continue to program our genes through this process called epigenetics. Our experiences, ranging from the food we eat and the air we breathe to the social interactions we have, have the power to change how our genes work. Epigenetics operates by placing biochemical marks on top of the genome (epi="above", genetic="our genes") that control how that gene gets turned on and off.

Studies in animals have shown us that how the baby is cared for early in life affects the epigenome of many genes. Studies in monkeys have found that



monkey infants raised without their mothers have an epigenome that is different for hundreds and hundreds of genes compared to baby monkeys reared by their mothers. Importantly, though, it also looks like differences in the epigenome from mother-reared monkeys decreases, but doesn't go away completely, once the monkey infant is placed in a more normal environment. One recent study of children in institutional care in Russia found that children currently living in an institution had significantly different epigenomes compared to children who had always lived in a family. Because these researchers only examined children who were currently living in an institutional setting, we don't know if these changes last after children have been adopted into families.

We know from many years of research with families created through

international adoption that the stories of these children are predominantly ones of tremendous resilience and recovery from early adversity. To begin to answer questions about whether we can see signs of this recovery at the level of epigenome, we are currently studying a group of adolescents adopted from institutional care. In the epigenetics study, we are comparing these adolescents to age-matched peers raised in their families of origin. Families come to our lab, where parents and children fill out questionnaires about stressful events in the child's life, their functioning in school and with peers, and their mental and physical health. Adolescents also provide a blood sample, which we will use for the epigenetic analysis.

We collected information on 43 youth last summer and will see a similar number this summer. Then the blood will go off to the lab of our collaborators at the University of British Columbia. The two students running this study, Elisa Esposito and Jena Doom, will follow to learn more about how to perform and interpret epigenetic findings. At some point there will be a big meeting with Dr. Gunnar and Dr. Kobar, the head of the Canadian lab, and these students to discuss and interpret the findings. Stay tuned for results in next year's newsletter.

If you have any further questions or comments about this study, please contact us at umngenetics@gmail.com.

Transition into the Family Study

*By Megan Gunnar, Shanna Mliner,
Bonny Donzella, Bao Moua,
Kalsea Koss*

The goal of the Transition into the Family Study is to intensively follow children adopted from institutions, seeing them every eight months for the first two years that they are in their families. These initial years are a period of rapid recovery from pre-adoption deprivation for children who lived in orphanages or other institutions. We are following patterns of change in emotions, relationships, growth, thinking and learning, and physiology and using these changes to predict children's functioning both at the cusp of entering kindergarten and then in the kindergarten classroom. Our goal is to determine ways of identifying children who may need extra help early on, before they get to school.

How Far Along Are We?

We have completed recruitment with 222 participants (114 female), including 167 children adopted internationally (115 post-institutionalized and 52 post-foster care) and 55 children born into their Minnesota families. All of the families have completed sessions 1–4 and 90 percent have completed their five-year-old research session visit. Families are contacted after this visit to continue a kindergarten assessment once their child enters kindergarten.



What Have We Learned So Far?

In last year's newsletter, which you can read on our website, we wrote about indiscriminate friendliness, children becoming emotionally attached to their parents, fear and positive emotions, and early identification of attention problems. Those were issues we could examine with only the first two sessions completed. Now we have begun looking at the first four sessions, covering the first two years that the post-institutionalized children were in their families.

Stress Hormones

One of the questions we have been studying is whether children who have experienced early deprivation show changes in the regulation of their stress hormone system. This system is called the hypothalamic-pituitary-adrenocortical system and it produces the hormone cortisol.

Cortisol is a powerful steroid hormone that affects all organ systems in the body, including the brain. When this system is activated chronically, it undergoes changes to “down-regulate” the hormone's production, presumably to protect the body and brain from the hormone's potentially damaging effects. When we have studied children while they were in institutional care in Romania and Russia, we found that the normal daily rhythm in the hormone was significantly suppressed. We expected to see this soon after adoption, but by two years post-adoption we expected the stress system to be very close to functioning like it does in children who have grown up in their families.

This is not what we have found. By as early as two months post-adoption, the daily patterning of the hormone looks quite normal. Statistically, we can detect that

We are still sorting out the brain wave data, but here is what we have seen so far. The pattern of brain waves looks just as mature in the children adopted internationally as it does in the non-adopted children.

the rhythm isn't as robust as it is in children who have been reared in their families from birth, but it looks much better than what we saw for children living in institutional care. While this seems like very good news, we didn't see any further improvements from two months to two years post-adoption. And rather surprising to us, the children adopted from foster care looked just like the ones adopted from institutional care. We have included a figure so that you can see how slight the difference is, but it is there, in **Figure 1**. Then for the post-institutionalized children we asked whether anything about their institutional experience predicted "less marked" daily rhythm. We

found that if parents described the institution as "poorer" in the quality of social care the child received (e.g., number of caregivers, whether caregivers interacted with children, etc.) then this predicted an even less marked daily rhythm. Children who received higher quality social care were more similar to children reared in their families from birth. We were especially interested in whether children's cortisol predicts problems in behavior and emotion regulation. We found that it does and that it seems statistically to mediate the link between being adopted internationally and having more behavior problems.

We are still analyzing the cortisol data we took during the sessions and will be getting more cortisol data when we see the children in kindergarten.

We know that completing the home kit and collecting all those samples is a big chore for families. We truly appreciate it and hope that this study will help us better understand why some children struggle more with

emotional issues than others following adoption and begin to point us towards better ways to help them and their families.

Brain Activity

Two years after adoption we collected data on children's brain waves while they focused their attention on a toy. We were interested in two questions regarding these brain wave (Electroencephalogram; EEG) data. First, would internationally adopted children show the same level of maturity in their pattern of brain wave activity as the children who lived with their families all their lives? Second, would they show patterns of left-right hemisphere activity related to emotional reactivity?

We are still sorting out the brain wave data, but here is what we have seen so far. The pattern of brain waves looks just as mature in the children adopted internationally as it does

Transition study, to page 6

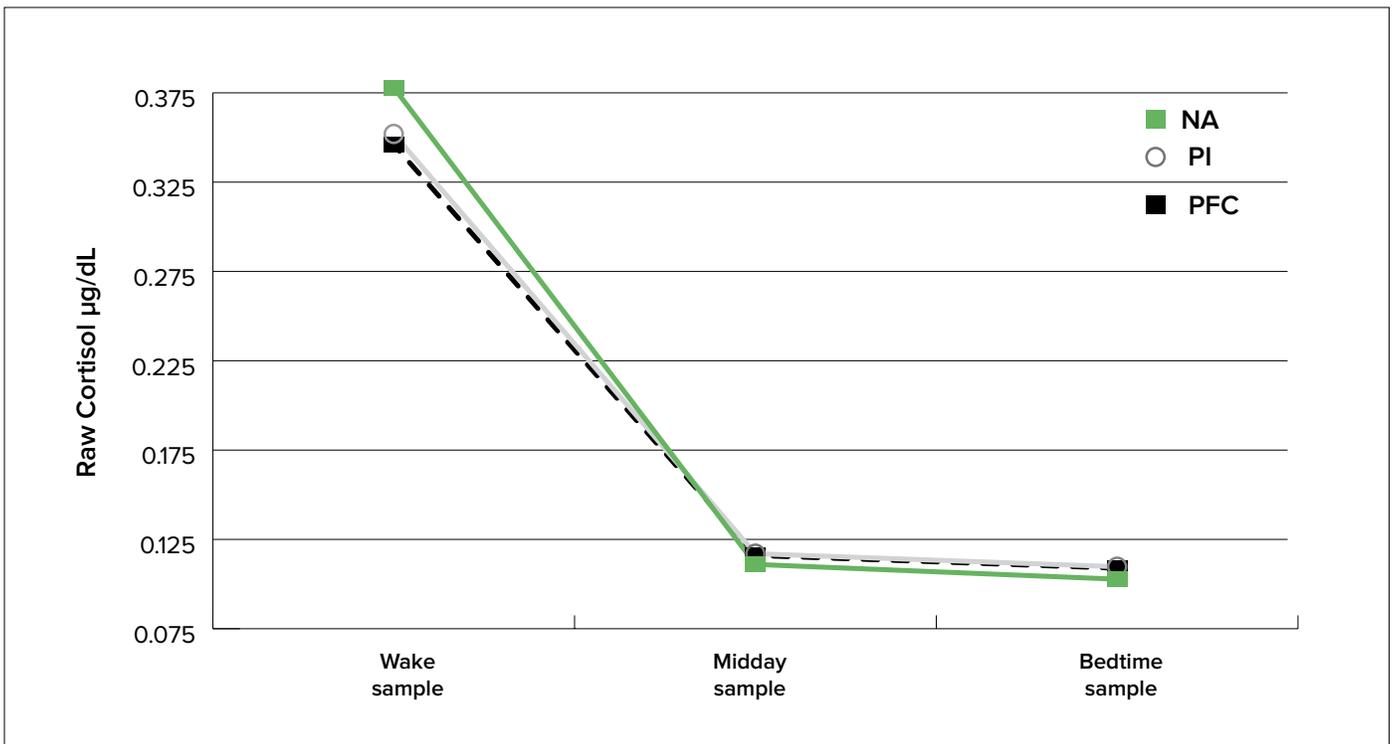


Figure 1

in the non-adopted children. This is different than what we have seen when we have studied children closer to the time they are adopted, in which case we have found that children from institutions have less mature brain wave patterns and the degree of immaturity predicted problems with attention later in development. We have a previous study in which we found those same children had caught up by five years of age. Here it looks like it takes no more than two years for children's brain wave activity to catch up.

The answer we are getting to our second brain wave asymmetry question is surprising and puzzling to us. We were interested in measures of asymmetry because it is well established that extreme activity over the right hemisphere the children are more likely to be more fearful and at risk for anxiety and depression; while extreme activity over the left frontal area of the brain are more likely to be exuberant, and if they have problems it is because they are too exuberant. We expected to see that post-institutionalized children would show more activity over the right hemisphere as they report themselves to be more fearful. We were wrong.

We have found that the post-institutionalized children, on average, show greater activity over the left prefrontal cortex, while post-foster care children do not differ from non-adopted children, having averages that are close to a balance between hemispheres. Perhaps this finding might relate to indiscriminate friendliness, which post-institutionalized children often show and which can be thought of an exuberant approach to people, even ones they don't know. We are continuing to think about how best



to interpret this finding and which aspects of the children's behavior it might relate to.

Kindergarten Assessment

This portion of the Transition into the Family Study is just finishing up the third school year of data collection. At the end of this school year, we anticipate that we will have completed 132 kindergarten classroom observation visits. Observers visit the kindergarten classroom of past Transition Study participants and sit quietly recording the child's attention and engagement in academic activities, as well as their social interactions with classroom peers. Each child's teacher completes a survey about classroom behavior and each parent completes a survey with information about behavior and relationships at home. We also gather three saliva samples during the school day to use in conjunction with the previous Transition Study samples gathered both at home and in the laboratory sessions.

It has been our pleasure to be welcomed into schools across the states of Minnesota, Iowa, Wisconsin, and Missouri. Families and teachers from states further away than our travel budget allows us to visit have graciously completed the surveys. We have observed in Chinese, German, French, and Spanish language immersion programs. Ten families have chosen to home school their children and so were not eligible for this phase of the project, and ten families have declined participation. Only two schools have declined participation.

Although our federal funding for this project has officially ended, we are committed to following as many of our Transition Study families into kindergarten as possible. This next 2014–2015 school year will definitely be our last year of the Transition Study and Kindergarten Assessment. In October, we will send letters to all of our Transition Study families who have not yet participated in the Kindergarten Assessment to let them know whether we will be able to complete the full classroom visit protocol. Since we are still actively gathering data and the project is not yet complete, we do not yet have any results to share from the Kindergarten Assessment, but plan to do so in next year's newsletter!

Sincere thanks to all of the Transition Study families who have supported this project for so many years across the multiple sessions, home kits, and helping us work with school principals, district administrators, and classroom teachers. If you have any questions about the Kindergarten Assessment, please contact Shanna Mliner at newma039@umn.edu or 612-624-4351.

Iron Deficiency Increases ADHD Symptoms and Lowers IQ 2.5-5 Years Post-adoption

By Jena Doom

Poor pre-adoption nutrition and difficulty absorbing nutrients from food, due to parasites or chronic stress, leads to iron deficiency (ID) at arrival in approximately 25 percent of internationally adopted children. ID during early childhood can affect the developing brain. Researchers often do not account for nutritional effects when studying cognitive and emotional development in adopted children. To examine whether iron adds to our ability to predict how children will do cognitively, we collected information about iron status at adoption and analyzed information we have on children's

cognitive functioning 2.5–5 years after adoption.

We found that both the length of time children spent in an institution and their iron levels at adoption were important when predicting cognitive scores at approximately age five. Children who were adopted internationally had more Attention Deficit Hyperactivity Disorder (ADHD) symptoms than non-adopted children. Among the adopted children, those with ID anemia (IDA: severe ID) and ID without anemia (less severe ID) showed more ADHD symptoms than children with normal iron levels (**Figure 2**). Likewise, children

who spent longer periods in an institution before adoption had more ADHD symptoms than children with less time in an institution. Internationally adopted children with more severe ID at adoption also had lower IQ scores at age five than children with normal iron levels. These findings underscore the importance of providing good nutrition to children living in institutions, as well as monitoring iron status and treating ID as soon as possible after adoption. For more information about nutrition for adopted children, visit adoptionnutrition.org and spoonfoundation.org.

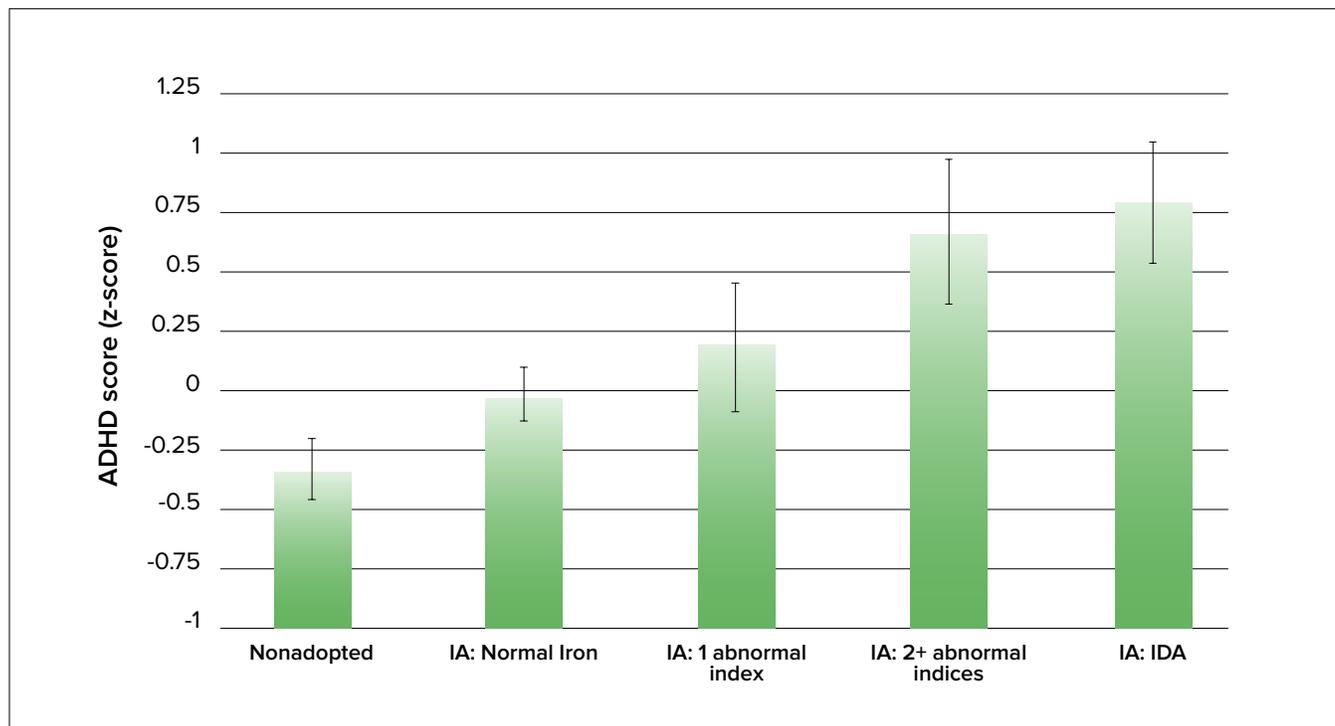


Figure 2

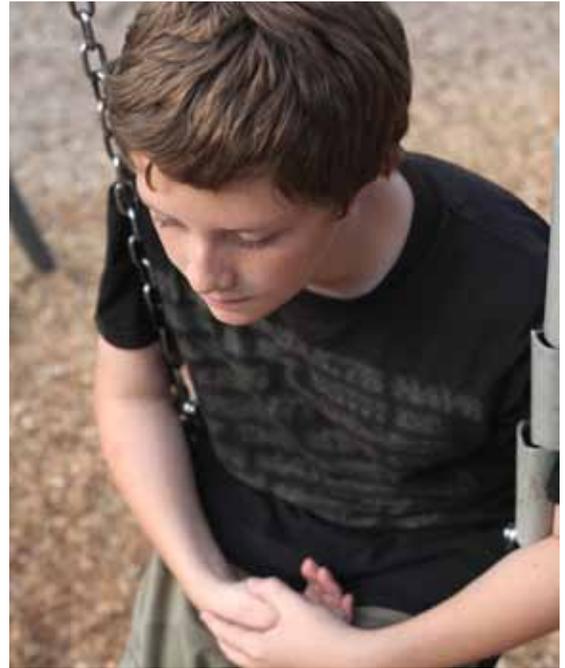
Behavioral Inhibition Survey

By Megan Gunnar, Alyssa Miller, Bonny Donzella

We know that when we ask internationally adopted children to describe their behavior, by late grade school many post-institutionalized children describe themselves as anxious, especially about being separated from their parents. When colleagues have studied the response of the amygdala (a brain structure important in fear) response to faces expressing fear or anger, children adopted from institutions, on average, show a larger amygdala response than do children without early histories of institutional care. Some internationally adopted children are also socially shy and anxious. Given these findings, we are interested in finding treatments that might work to prevent these internationally adopted children from developing anxiety disorders.

There is a new intervention that is being tried on children who are socially anxious called “attention bias training” or ABT. When socially anxious children are shown a slide with two faces, one angry and the other neutral, their attention is grabbed by the angry face and they have trouble tearing their attention away. They have a bias towards negative, threatening information. ABT works to train the brain to be biased away from threat by repeatedly (over hundreds of trials over many days) rewarding the child for looking to the non-threatening face and ignoring the threatening face.

We are very interested in working with colleagues at the National Institute of Mental Health, the University of Maryland, and the University of Oregon to get a grant to try this type of intervention and then to study both the children’s behavior and changes in the brain using neuroimaging. Our group would study high anxious, internationally adopted children, while the group at Maryland would study high anxious children reared from birth in families like those who adopt internationally, and the group in Oregon would study high anxious children who have been in the U.S. foster care system. There



is evidence that this training works for high anxious, non-adopted children, but will it work for those whose anxiety may stem from early histories of neglect, deprivation, or abuse? That is what we will be asking.

But first we had to prove to people that we have enough socially anxious children to study. Because the common picture is that children adopted from institutions are indiscriminately friendly and socially outgoing, we were concerned that grant reviewers would dismiss our study and not fund the grant.

So we asked for your help in proving the availability of socially anxious internationally adopted children. Last spring we sent e-mails to all 607 of you who have internationally-adopted children between 7 and 11 years of age asking you to go online and complete a questionnaire that examined social inhibition or shyness. Over half of those asked responded (394 total, 164 parents of a boy, 230 parents of a girl). Thank you so much. A total of 131 of the children (33.2%) had behaviors that can be classified as high *Social Inhibition*. We continue to prepare a grant submission and hope for support for this work.

To Trust or Not to Trust: Social Decision Making in Internationally Adopted Youth



By Clio Pitula, Kathleen Thomas, and Jennifer Wenner

Making decisions in social situations about whether or not to trust others is a critical part of social competence. For example, children must decide when it's okay to share a secret with a friend, who to trust with their card collection, and how to respond when a peer does not follow through on a promise. Although making decisions about trusting others has not been examined in internationally adopted youth, we wondered if their early experiences may have affected how they make decisions about trusting others when doing so is a bit risky. Given that some post-institutionalized children are willing to wander off with a nice stranger, we suspected they might be too trusting. In addition, we have previously found that internationally adopted youth are more likely to experience social problems, including victimization and

rejection by peers. We reasoned that these difficulties might reflect a more general deficit in using the behavior of others to decide whom to trust. In the present study, we focused on trust-related decision making and learning in post-institutionalized youth.

As part of a large study we did on genes (the Gene and Resilience Study), we asked 53 post-institutionalized youth to complete a computerized Trust Game in the laboratory. Youth were almost 13 years old, on average, when they completed the task. They came from nine different countries and were adopted at between four and 62 months of age. In addition, we recruited 33 youth born and raised in their families in Minnesota to serve as a comparison group. In these analyses, we were not interested in the BDNF (brain derived neurotrophic factor)

Social Decision Making, to page 10

gene, but in whether being in an institution and being there longer before adoption would be related to a different pattern of responding during the Trust Game.

What is this trust task? On each trial of this game, the player has to decide how many of six coins to give away to another player. In the “peer condition” coins given away would then triple in number and the other player would decide how many to give back. If trust is reciprocated, the player gains coins; if trust is not reciprocated, the player loses coins. The other player was always the researcher, but the youth were led to believe it was another youth they were playing on the internet. To be sure this was about trust in other people, we also had the children play a lottery game that was identical except here they knew they were investing and the computer would decide how much money they gained, if any, from investing.

In the “lottery condition,” participants decided whether or not to invest their six coins in a computerized lottery. The monetary outcomes of the lottery were identical to the peer condition: winning the lottery left the participant with 12 coins, whereas losing the lottery resulted in three coins for the participant.

During the baseline run, we wanted to examine natural tendencies towards sharing or not, so participants did not receive any feedback. Next, in order to examine learning in response to feedback, we varied the likelihood that participants’ trust or investment would be reciprocated. First, participants’ trust or lottery investment were reciprocated over two thirds of the time (run 2). Next, reciprocation rates dropped, so that participants’ efforts were rewarded only one third



of the time (runs 3 and 4). Note that although participants were initially told they were playing with real kids online, at the end of the game we revealed that the “peers” were actually researchers playing via the computer. Then we asked participants whether we could still keep their results after

they knew we had tricked them. Thankfully, most kids said yes!

First, we simply asked during the baseline (no feedback) condition how much the youth were willing to trust an anonymous peer. Children adopted later from institutions were less likely to trust than were children raised since birth in their families in Minnesota (Figure 3). This was especially true of children adopted after a year of age. Further, our comparison children were more likely to trust in a peer than to trust in the lottery. That was not the case for the adopted children. As you can see, the lines on the bar graph representing standard error of the means overlap for both the earlier and later adopted youth, meaning that they were no more likely to trust a peer than the lottery.

Next, we looked at what happened when they got feedback about whether the peer was trustworthy or not and whether the lottery paid out well or not. Here we found that as soon as they got feedback that the peer wasn’t trustworthy, later adopted post-

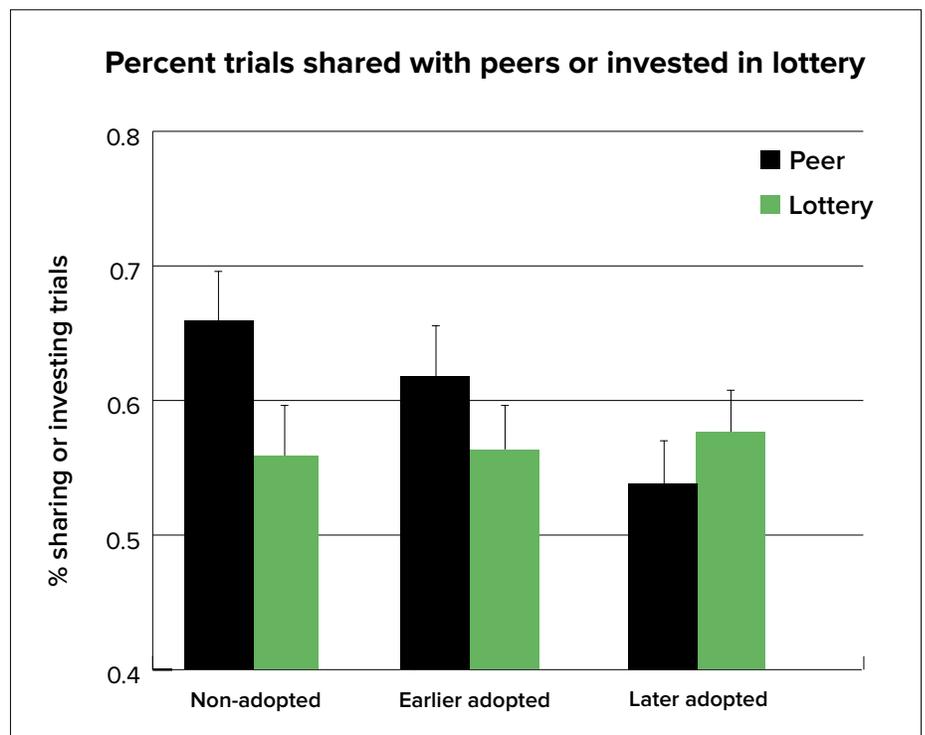


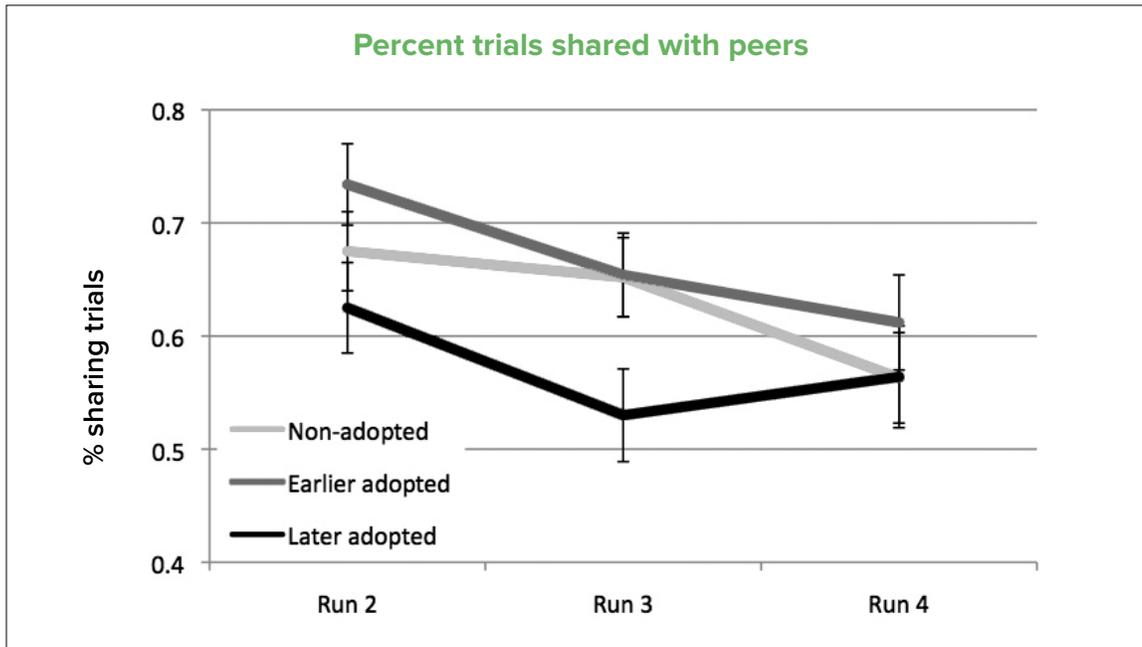
Figure 3

institutionalized children decreased sharing their coins. They did so much more than youth raised in their families since birth (see **Figure 4**, top graph).

In contrast, when the lottery stopped paying out much, the youth reared in their families stopped investing in the lottery, while the post-institutionalized children didn't and the later-adopted children seemed to increase their investments a bit (see **Figure 4**, bottom graph).

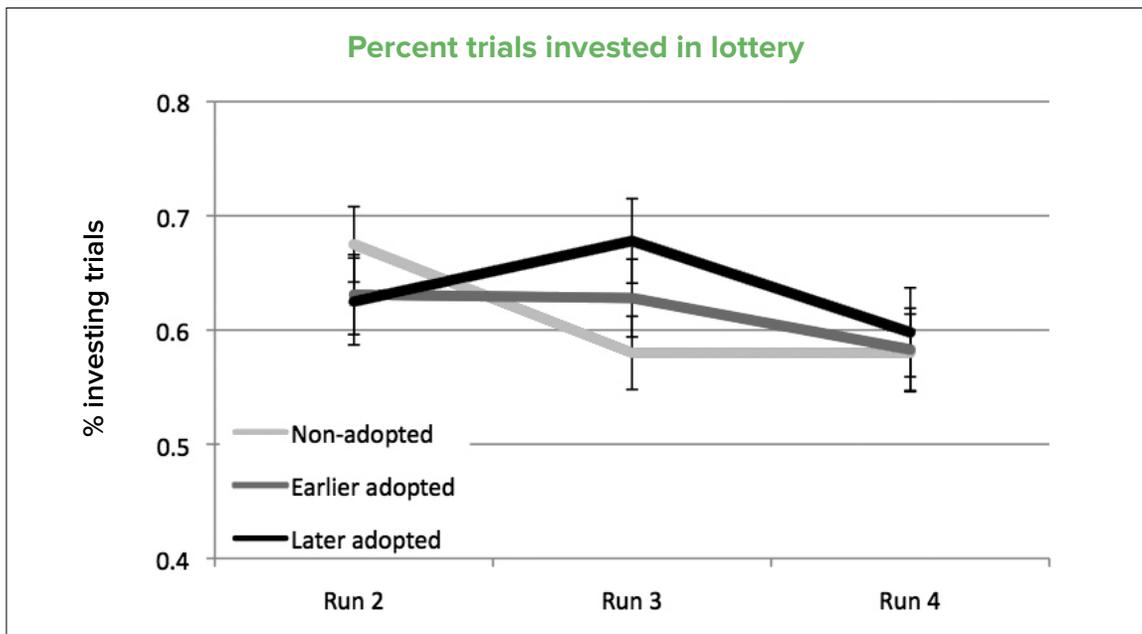
Taken together, these findings suggest that internationally adopted youth may be particularly

suspicious of unknown peers. What we don't know is whether this reflects experiences they have had with peers since adoption or whether it might reflect their early pre-adoption experience, perhaps needing to compete with other children in the orphanage to get their own needs met. In either case, if these findings hold up they may help explain why some post-institutionalized children struggle in their relationships with peers. These findings also highlight the importance of attending to social learning in later-adopted post-institutionalized children.



* Run 2: trustworthy peer or good lottery payout

* Runs 3 and 4: peer is untrustworthy or lottery pays poorly



* Run 2: trustworthy peer or good lottery payout

* Runs 3 and 4: peer is untrustworthy or lottery pays poorly

Figure 4

Genes and Resilience Study

By Kathleen Thomas, Ruskin Hunt, Jennifer Wenner and Raquel Cowell

The ability to think flexibly and abstractly increases dramatically during adolescence. Collectively these abilities, along with working memory and the ability to inhibit an automatic response, are known as executive function (EF). EF abilities rely on areas in the front of the brain called the prefrontal cortex. Because development of the prefrontal cortex continues throughout childhood, adolescence, and even into early adulthood, it is possible that experiencing deprivation early in life may impact the development of these brain structures. To test this possibility, we examined brain activity in 11- to 14-year-old youth while they completed an EF task. Youth who had spent time in institutional care before adoption and those who were born and raised in Minnesota took part in the study. We conducted this study in collaboration with Professor Megan Gunnar here at the University of Minnesota and Professor BJ Casey's lab group at Weill-Cornell Medical Center in New York, New York.

In our previous newsletters we told you about our finding that children adopted later than 12 months of age have more trouble with inhibition, and that regardless of their age of adoption the children who experienced deprivation early in life have a smaller prefrontal cortex compared to the non-adopted children. We now have



data from our functional brain scan tasks. Teens performed an EF task called the “finger-number task” while lying in an MRI scanner. The MRI scanner measures the brain's activity (i.e., which areas of the brain are working hardest and using more oxygen) while the participant completes the task. (Note: The first 121 internationally adopted teens to participate in our study performed this task in the MRI scanner. An additional 45 teens, tested later in the study, performed a card game and a face-processing task in the scanner. We are currently analyzing those data and plan to

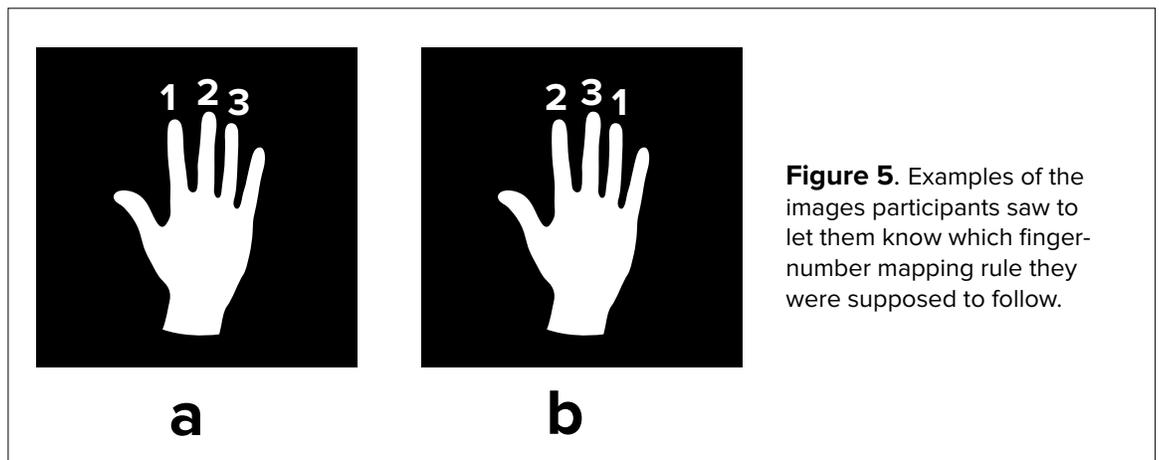


Figure 5. Examples of the images participants saw to let them know which finger-number mapping rule they were supposed to follow.

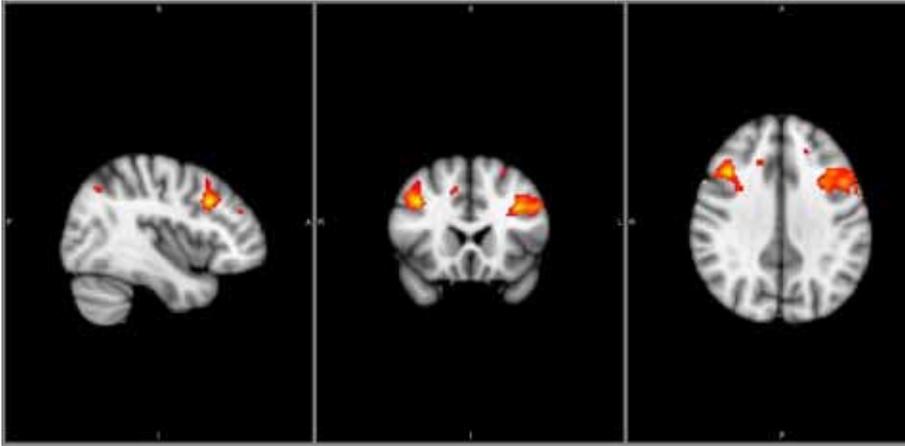


Figure 6. Post-institutionalized youth, regardless of their age of adoption, activate the dorsolateral prefrontal cortex more than their non-adopted peers.

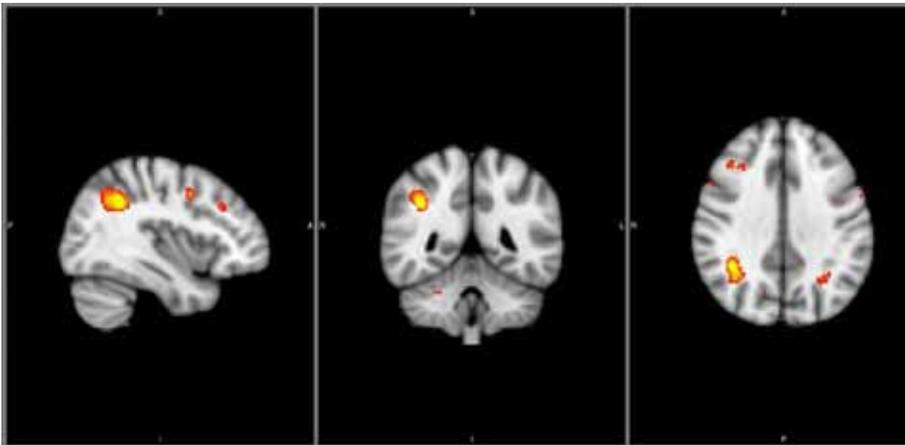


Figure 7. Youth adopted out of institutional care after 12 months of age activate regions of the parietal cortex more than earlier-adopted and non-adopted youth.

report results of these data in a future newsletter.)

The finger-number task relies on a variety of EF skills including working memory, inhibitory control (ability to inhibit an initial impulse), and cognitive shifting from one set of rules to another set. The rules of the task change regularly and the kids have to keep track of the current “correct” rule. In the easy trials, teens were told to press a button with their index finger when they saw the number ‘1’, middle finger for ‘2’, and ring finger for ‘3’ (see **Figure 5a**). Then we would change the rules. In the harder trials, the kids

might, for example, have to press their ring finger when they see a ‘1’ on the screen, index finger for ‘2’, and middle finger for ‘3’ (see **Figure 5b**). To do the harder trials successfully, one has to remember the new rule and inhibit the old, easier rule.

We first looked at how well the youth were able to do the task. Youth who were adopted out of institutional care and into their Minnesota families by 12 months of age did the task just as well as those who were born and raised in their Minnesota families. As a group, youth who were adopted later out of institutional care did fine when the

trials were pretty easy, but had more difficulty on the hard trials.

We weren’t terribly surprised that the earlier-adopted youth performed the task as well as the non-adopted youth and that both of those groups outperformed their later-adopted peers. What was surprising, though, was that the brain activity during the task was quite different for each of the three groups. Regions in the dorsolateral prefrontal cortex activated more during the task for the adopted youth than the non-adopted youth, regardless of how much time the adopted youth had spent in institutional care (see **Figure 6**). What this suggests to us is that those youth who had experienced deprivation early in life needed to engage systems in the brain that regulate behavior in order to complete the task.

We also found brain activity differences between the earlier-adopted and later-adopted youth. Later-adopted teens activated a region of the parietal cortex near the back of the brain more than either the earlier-adopted kids or the non-adopted kids (see **Figure 7**). Our analyses suggest that the activation in the parietal cortex is related at least in part to the later-adopted youths’ poorer performance in the task. One possibility is that they activate this region to compensate for the difficulty they are having performing the task.

Looking at the task performance and brain imaging data together gives us clear evidence of the flexibility or “plasticity” of the brain. In spite of the adversity the teens experienced early in their lives, they are able to recruit different structures in their brains to accomplish the task at hand. The adoptive family environment is a strong protective factor to support cognitive performance and brain functioning.

Research Opportunity—Puberty Study

By Megan Gunnar, Bonny Donzella, Bao Moua, Alyssa Miller and Kalsea Koss

The MnIAP, in collaboration with Dr. Brad Miller, a pediatric endocrinologist at Amplatz Children's Hospital, just launched a study looking at pubertal development in teens. We are interested in how adversity early in life might shape the body's stress response systems. Puberty is a time of great change (!) and we believe that it may be an opportunity to reshape or "recalibrate" the body's stress response systems. In this study, we are examining how variations in early adversity (such as adoption from an institution) work with current life stress and puberty to shape cognitive and behavioral functioning.



This study looks to measure early adversity, current life stress, and pubertal development over time. There will be three time points over two years, with two visits at each point. Interested in participating? We are inviting children ages 7–14 who were adopted at between six and 60 months of age after spending at least 75 percent of their lives in

institutional (vs. foster) care. We are also inviting children of the same age who were born into their families.

We began enrolling the first families in this study in January and so far have seen 29 internationally adopted children and five children born in Minnesota. We understand that families are extremely busy during these teen years, however it is important to us that we reach every possible family. We wish to enroll enough families to be able to present meaningful research data about this important time in young people's lives.

If you know of a family with kids ages 7–14, please let them know of this study and have them contact Amanda Burkholder at 612-624-9322 or email at pubertystudy.umn@gmail.com.

IAP INVESTIGATORS AND STAFF

Megan Gunnar
Principal Investigator
Institute of Child Development
iap@umn.edu

Jennifer Armerding
Clinical Interviewer
Institute of Child Development
pubertystudy.umn@gmail.com

Jenalee Doom
Graduate Student
Institute of Child Development
doomx008@umn.edu

Jan Goodwalt
Registered Nurse
Institute of Child Development
pubertystudy.umn@gmail.com

Alyssa Miller
Research Assistant
Institute of Child Development
mill5420@umn.edu

Clio Pitula, Graduate Student
Institute of Child Development
pitul001@umn.edu

Brad Miller, MD
Pediatric Endocrinologist
Amplatz Children's Hospital

Meg Bale, PR Coordinator
Institute of Child Development
balex002@umn.edu

Bonny Donzella
Sr. Research Fellow
Institute of Child Development
donze001@umn.edu

Jamie Lawler
Graduate Student
Institute of Child Development
lawle084@umn.edu

Shanna Mliner
Sr. Research Fellow
Institute of Child Development
newma039@umn.edu

Terri Jones, Registered Nurse
Institute of Child Development
pubertystudy.umn@gmail.com

Richard Lee, Co-Investigator
Psychology
richlee@umn.edu

Amanda Burkholder
Study Coordinator
Institute of Child Development
pubertystudy.umn@gmail.com

Elisa Esposito
Graduate Student
Institute of Child Development
ea.esposito@gmail.com

Kaitlin Lucas, Junior Scientist
Institute of Child Development
kaitlin.lucas@gmail.com

Bao Moua, Office Admin
Institute of Child Development
moua0066@umn.edu

Kathleen Thomas
Co-Investigator
Institute of Child Development
thoma114@umn.edu

Ruskin Hunt
Research Associate
Institute of Child Development
hunti011@umn.edu

Jennifer Wenner
Research Associate
Institute of Child Development
wenner@umn.edu

Madeline Harms
Graduate Student
Institute of Child Development
harms124@umn.edu

Amanda Hodel
Graduate Student
Institute of Child Development
hodel004@umn.edu

Kelly Jedd, Graduate Student
Institute of Child Development
jeddx002@umn.edu

MnIAP Welcomes New Staff

Meet our new staff members Jennifer Armerding, Amanda Burkholder, Jan Goodwalt, and Terri Jones! They all joined the IAP staff in September 2013.



Jennifer is a clinical interviewer on the Puberty Study team.



Jan is a registered nurse on the Puberty Study.



Amanda is the Puberty Study schedule coordinator.



Terri is a registered nurse on the Puberty Study.



International Adoption Project (IAP) Registry

Be informed about ongoing international adoption research opportunities by enrolling on the IAP Registry. Families do not have to live in Minnesota, nor do they have to have adopted in Minnesota in order to join. Any family with a child up to the age of 18 is welcome. To learn more, please contact us at 612-626-8949, email us at IAP@umn.edu or visit us online at www.cehd.umn.edu/icd/research/iap

MnIAP Parent Board

MnIAP appreciates the dedication and contribution of our parent board members. Members give generously of their time and come from varied backgrounds and experiences. MnIAP currently has eleven parent board members.

2014 Board Members

Stacy Anderson
Heather Ball
Diane Benjamin
Patti Bower
Kate Brady
Dave Casey
Jamalee Desmond
Cari Lee
Marc Markell
Deborah Paulsrud
Laurie Pickert

Stay In Touch

We would like to maintain current information for all of our registry families so that we can keep you apprised of new studies and results.

If you've recently moved or have a new email address, please update your registry info by emailing IAP@umn.edu, calling 612-626-8949, or completing the enrollment form online at: www.cehd.umn.edu/icd/research/IAP

Collaborations & Partnerships

COLLEGE OF EDUCATION
+ HUMAN DEVELOPMENT

UNIVERSITY OF MINNESOTA
Driven to DiscoverSM



CENTER FOR
*neuro***BEHAVIORAL**
DEVELOPMENT

**INTERNATIONAL
ADOPTION PROJECT**
University of Minnesota
51 East River Road
Minneapolis, MN 55455

Nonprofit Org.
U.S. Postage
PAID
Twin Cities, MN
Permit No. 90155

RETURN SERVICE REQUESTED