SUMMER 2016: NEWS FROM THE UNIVERSITY OF MINNESOTA

Gunnar Lab for Developmental Psychobiology Research

Greetings from Professor Megan Gunnar

The Gunnar research group is tackling the challenge of understanding how children navigate the transition from childhood to adolescence. This can be a difficult time for children and their families. Puberty awakens ideas and feelings that are new and powerful. Bodies change in unpredictable ways. Limbs literally grow overnight and children trip over their feet or knock things over because the brain hasn't quite adjusted to the new length of arms, legs and feet. Psychologists used to think of this time as one of "Sturm und Drang", meaning "Storm and Stress", although we now realize that along with the challenges come opportunities. The brain develops rapidly over this period which likely means that experiences during this time will have more powerful effects than would similar experiences in late childhood or early adulthood. In the Gunnar research group, our focus is to understand how stress and emotion systems "reorganize" during the transition from childhood to adolescence and how early and current experiences of stress and adversity interact during this period to influence physical and psychological health.

For those of you who took part in our Transition into the Family which started when your children were toddlers, we are still analyzing the information we gained and making new discoveries that we also will be sharing in this newsletter as well.

We hope that all of you reading this newsletter find the stories interesting. Please contact me with any comments you might have.

Thank you to all the families who have taken part in our research. You can find previous newsletters online at www.cehd.umn.edu/icd/research/gunnarlab.

—Regents Professor Megan Gunnar

Update from the Puberty Study

By Megan Gunnar, Bonny Donzella, Chris Desjardins, and Bao Moua

Puberty brings on many changes to both the bodies and the minds of children. The goal of the Puberty Study is to understand how the changes associated with puberty affect how children manage stress, both psychologically and physiologically. We think that puberty opens a window of opportunity for the biology of the child to recalibrate to current life conditions. For children who started out life in harsh conditions, the pubertal calibration period may reset the body to a less stress defensive mode. But we know that some children experience a lot of emotional stress during the pubertal period. For these children, puberty might ramp up the body's stress systems and contribute to the emotional turmoil they experience during adolescence. This is the idea we are testing in this study.

How far along are we?

We wish to thank our dedicated families; without your efforts we would be unable to do our work. As proof of this dedication, our home kit saliva collection for stress and pubertal hormones and questionnaires are being returned to us with a completion rate of 99%! Wow! We are impressed, and grateful.

We have recruited 295 participants, including 133 children adopted internationally and 162 children born into their Minnesota families. We have seen 290 families complete year 1. Of these, all but a few are continuing and we have so far seen 160 families in year 2. Again, nearly all year 2 families we have contacted are continuing and we have started seeing participants for their final year 3 visits. Each year participants complete two laboratory visits where we assess pubertal development, lean and fat body mass, how their stress systems function over regular days, and we challenge them by having them give a 5 minute speech and do some arithmetic in front of a few adults while they are being filmed and rated. The children and adolescents also complete an extensive interview to let us describe the stress and challenges in their lives at school and at home.

What have we learned so far based on year 1 data?

We are beginning to examine some preliminary findings. These results may change a bit as we continue to include fresh data and look at important contributing factors, but here is a peek!

Timing of Puberty: Although it has been reported that girls who start out life in harsh circumstances and then transition into highly resourced homes start puberty early, we are not finding that to be the case. The internationally-adopted girls in our study are moving through puberty at the same rate as the girls born into their families in the U.S. It looks the same way for the boys. Of course, we have two more years of assessment to complete before we are done and we will be able to follow the same individual over time. This means that when we are done, this will be the most comprehensive study of the impact of early "harsh" environments on pubertal timing yet completed and we will have a good deal of solid information to share with the pediatric community.

Height, Weight and Obesity Risk: The same theory that predicts that girls who start out in harsh circumstances will reach puberty earlier also predicts that children who were growth stunted before they were two years old due to poor nutrition or lack of responsive care will be at risk for obesity as they age if they shift into a high-resourced environment. Once again, our data seem to be proving the theorist wrong. While a number of the kids who were internationally adopted were small for their age at adoption, we don't find that they are more likely to be overweight than the children born in the U.S. Indeed, most of the children and adolescents in this study regardless of backgrounds were in the healthy range for weight for height (BMI), with only 7% in the seriously overweight range. This is lower than the Minnesota average. The internationally-adopted children are typically in the normal range for height, but they are a bit shorter than the kids in the sample who were born in the US. We used the World Health Organization Z-Scores where the mean of the world's population would be 0 and 66% of all children would fall between -1 and +1. We found that the internationally adopted children averaged minus 0.29 (a little below average) and the non-adopted children averaged plus 0.28 (a little above average). But anything between -1 and +1 is considered "normal".

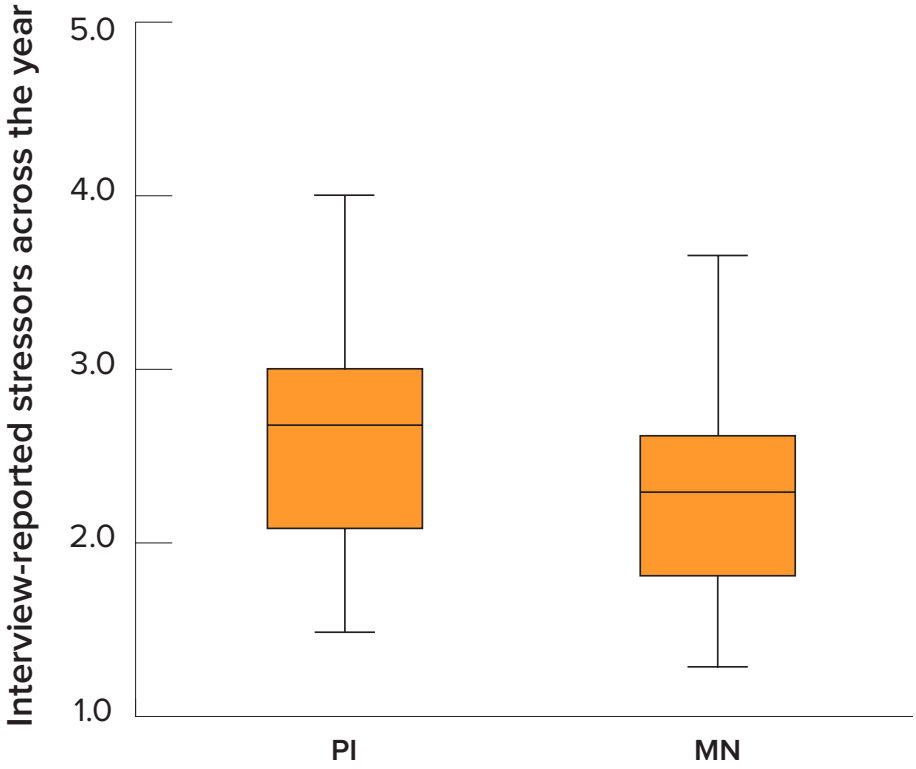


Figure 1. Stress reported in the interview at year one.

Reported Stress: Our stress interview asks about events in the last year. Children and adolescents are asked about school, friends, romantic partners, brothers and sisters, and parents. [You will be interested to know that so few kids said they had a boyfriend or girlfriend yet that we didn't analyze for romantic partner stress.] We listened to tape recordings of the interview and rated each area separately and then gave an overall rating on a 5 point scale from low to high stress. For this instrument, "2" is considered a typical level of stress for children and adolescents. Figure 1 shows the data using what are called "box and whisker" plots. The whiskers show where the lowest and highest scores were, the box shows where the 25th and 75th percentiles lie and the black line in the middle is the 50th percentile. As you can see, kids adopted internationally from institutional care describe more stresses in their lives currently than those born in the U.S. But there is a lot of overlap and for both groups most of the scores fall in an expectable range of 2–3. There are a few kids in each group who describe a good deal of stress in their lives but this is to be expected.

Puberty Study Update, to page 5

International Adoption Project: Adult Registry

The IAP Registry started in 1997 by U of MN researchers and the MN Department of Human Services to help physicians, adoption agencies, and professionals gather information and knowledge about pre-adoption experiences, mental health, risk and protective factors to share with the international adoption community. Much of our research work with the IAP Registry is on young children and adolescents. Our next phase of interest is to follow these young adolescents and learn about the transition to adulthood.

We hope to start an Adult Registry of individuals who were internationally adopted in childhood. Similar to the IAP Registry where parents can enroll to learn about research opportunities, the Adult Registry will be for individuals who are 18 years old or older and were internationally adopted in childhood. We will be asking for their input about what they want to learn about themselves and what they would like others to understand about their adoption experiences. Another goal is to form an advisory board made up of adults who entered the US through adoption.

If you are interested in enrolling on the IAP Adult Registry and/or joining our Adult IAP Advisory Board, please visit our website at: https://umn.ca1.qualtrics.com/SE/?SID=SV_4SHgYuidg4TBe85. You can also call the International Adoption Project at 612-626-8949 or email IAP@umn.edu.

Puberty Study Update, from page 3

Puberty and the Hormonal Stress Response

The purpose of the study is to see if puberty helps to recalibrate the stress hormone system. Cortisol is the hormone we are interested in and we have evidence that harsh/challenging early life conditions cause this system to become hypo (under) activated. This is likely because it was very active early in life and to protect the body and mind biological changes occurred to tone it down leading to "under" activity. Because we need to be able to increase our stress hormones to manage life's challenge, this hypo-activity could be making it hard for children adopted from harsh conditions to manage physically and emotionally stressful conditions. But puberty may "open windows" in our biology to re-organize our defensive systems.

So far, the results suggest that puberty is associated with significant changes in hormonal stress responses for children adopted internationally from institutional care. We have examined the cortisol response to the speech/math task for the 80% of year 1 data that has already been assayed. This is shown in Figure 2. The black lines are for children who are pre and early puberty, while the orange lines are for those who are mid and late puberty. The data from internationally adopted children are on the left. Before they go through puberty, internationally adopted children's cortisol stress response to the public speaking task is very blunted. They are just not mounting a hormone stress response even though they tell us they are stressed by the task. For those who are in the later stages of puberty, though, they have higher levels and they are showing a response to the task. The children who were born in the U.S. do not show this marked kind of change with puberty. These are early stages in our data so stay tuned as we firm up these findings with more data.

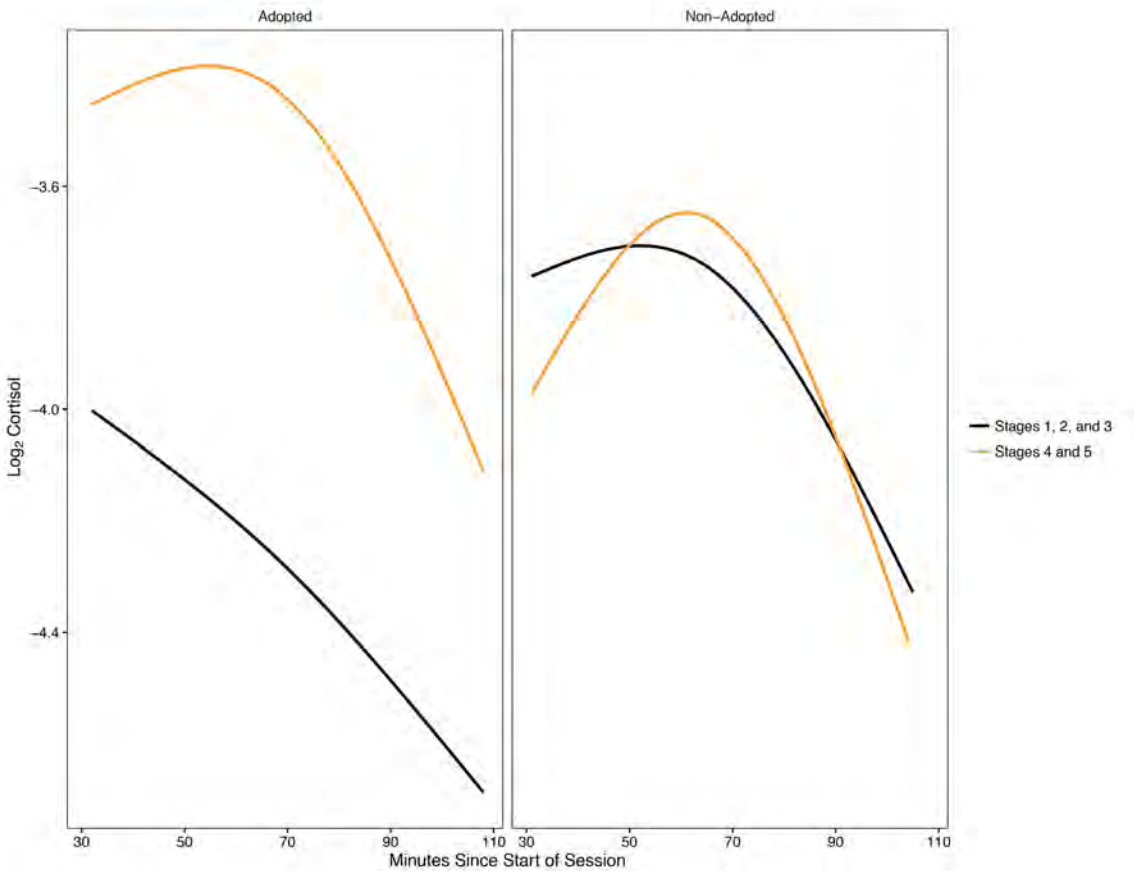


Figure 2. Cortisol level differences between pubertal children who are internationally adopted compared non-adopted children at year one speech task.

HELP US WITH SCIENCE!

We are still recruiting for the Puberty Study through August 2016. Youths currently between 7–14 years old, who were internationally adopted between 6-60 months old and spent 60% time in an orphanage, institution or hospital are eligible to participate. Non-adopted youths ages 7–14 who reside in Minnesota and are willing to travel to the University of Minnesota are eligible to participate.

Interested families can email us at pubertystudy.umn@gmail.com or call Lea Neumann 612-624-9322.

Can Peers Take Over When Parents Lose their Stress-Protective Potency?

By Jena Doom

We all know that as children become adolescents parents start to take second place to friends. Families still matter, but friends and their peer group become really important. While this can be hard on parents, it is what children are made to do. It is time for them to get ready to leave the nest. Recently our research group found that nature prepared children for this by shifting how their stress system functions as they move from childhood to adolescence. When children have their parents with them as they go through something stressful, the presence of the parent blocks the stress hormone system from responding. But when adolescents have their parent present, even when they say it is helping them, their stress hormone system responds with as much force as if the adolescent were on their own. The "switch" comes with puberty more so than age, as pubertal children of the same age get no stress hormone relief from the parent's presence, while those who were still pre/early puberty do.

But when adolescents have their parent present, even when they say it is helping them, their stress hormone system responds with as much force as if the adolescent were on their own.

In my doctoral dissertation, I asked whether adolescents simply transfer their "social stress buffering" reliance from parents to their best friends. I examined children who were 9 and 10 and teens who were 15 and 16. There were boys and girls in the study in equal number. Everyone came in with their best friend and their primary caregiving parent (mostly but not always their moms). They were there to give a speech, do math out loud, get filmed and be rated. When it came time to prepare for the speech, they found out whether their parent or their friend would go in with them. The parent or friend helped them prepare what they would say and then left and the child or adolescent then went through the test on their own.

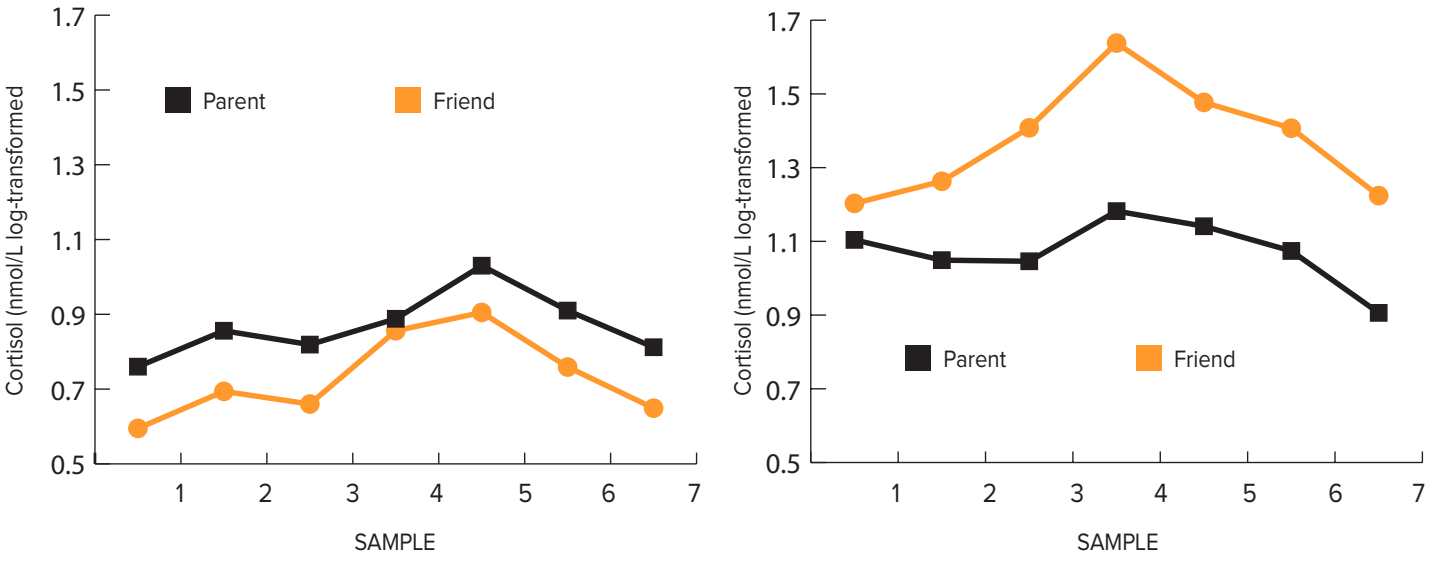


Figure 3. Cortisol responses to stress in children ages 9-10 (left) and adolescents 15-16 (left). Sample 2 indicates the onset of the stress task.

I found that friends don't have any effect on the cortisol stress response at ages 9–10. Unlike any of the studies we have done, we saw a stress response for the kids who are 9 and 10 years old even when they prepared with their parent. It looked like just bringing the friend to the session made the whole thing more stressful. In adolescence, preparing with the friend increased the stress hormone response. You can see this in Figure 3.

In this study, I also was interested in a hormone that protects the body from stress and that is stimulated by contact with people with whom we are close. That hormone is oxytocin. Consistent with the fact that even teenagers say that having their parent with them is helpful during this task, we found higher levels of oxytocin for all kids if they prepared with their parent. What was really happening, though, was that preparing with their best friend resulted in a lowering of oxytocin during the sessions. This was especially true for boys who in general produced lower levels of oxytocin than girls. This is our first study to examine oxytocin the pro-bonding and anti-stress hormone, so we have a lot to learn about what it is telling us about human development, relationships and stress regulation.

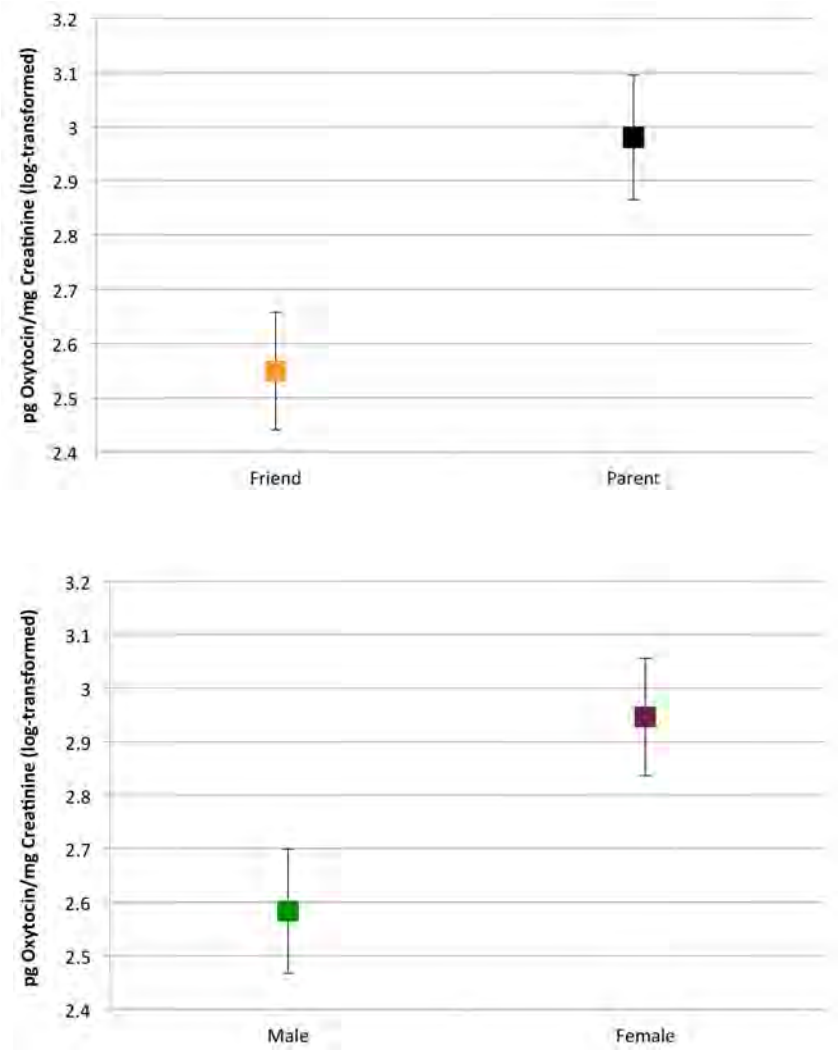


Figure 4. Oxytocin levels at the end of the session in the friend vs. parent condition (top) and in males vs. females (bottom).

How Healthy Are Internationally Adopted Children in Middle Childhood?

By Colleen Doyle

All children likely experience many different health problems, but for most children these problems are short-lived, mild, and do not interfere with their daily life. For some children, however, chronic health conditions have a bigger impact. Chronic health conditions are on-going illnesses like asthma, inflammatory bowel disease, and diabetes. While they can be managed with medical treatments, in general they are incurable and can affect quality of life.

Unfortunately, chronic conditions are becoming more common and costly. In the U.S., 117 million adults and 32 million children have one or more chronic disease. Nationally, we spend over 1.5 trillion dollars treating symptoms related to chronic conditions annually. This means that chronic illnesses account for $3 out of every $4 our country spends on health care.

Recent research suggests that our risk for chronic conditions may be rooted in early childhood experiences. The mechanisms that link early experiences to long-term health are complicated and not completely understood. However, researchers are beginning to focus on two main pathways, which likely work together to increase risk for chronic conditions.

In the first pathway, early chronic stress is associated with habits and behaviors that are bad for our health, like smoking, eating poorly, and not exercising. Over time, these behaviors can increase the risk for chronic conditions. In the second pathway, early chronic stress is associated with alterations to important biological regulatory systems, like the immune system.

This second pathway is a new area of scientific inquiry. So far, we have very strong evidence from animal research that supports this pathway. This research shows that our immune system is shaped early in life in ways that should help us deal with the world we are born into. Chronic stress due to harsh conditions (i.e. high exposure to germs, poor nutrition, lack of attention from adults) can "program" immune system cells to act as if they are always fighting a mild infection. As a result, the immune system is more likely to have an ongoing, exaggerated response to challenges in the environment, from dust to pollen to viruses. This leads to chronic inflammation in the body,

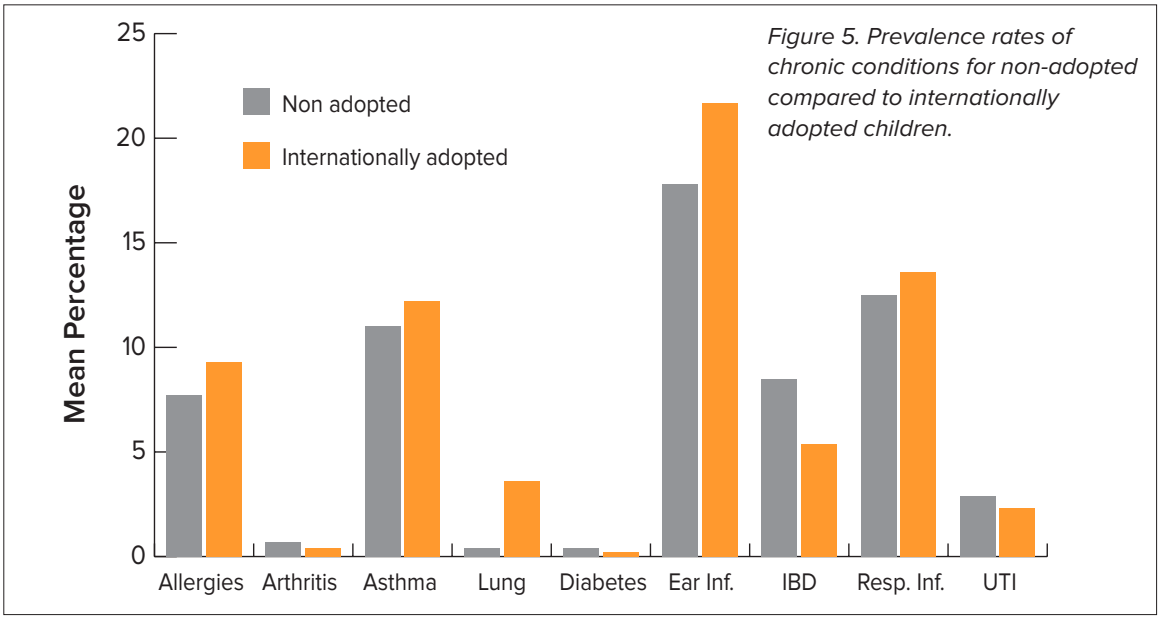


Figure 5. Prevalence rates of chronic conditions for non-adopted compared to internationally adopted children.

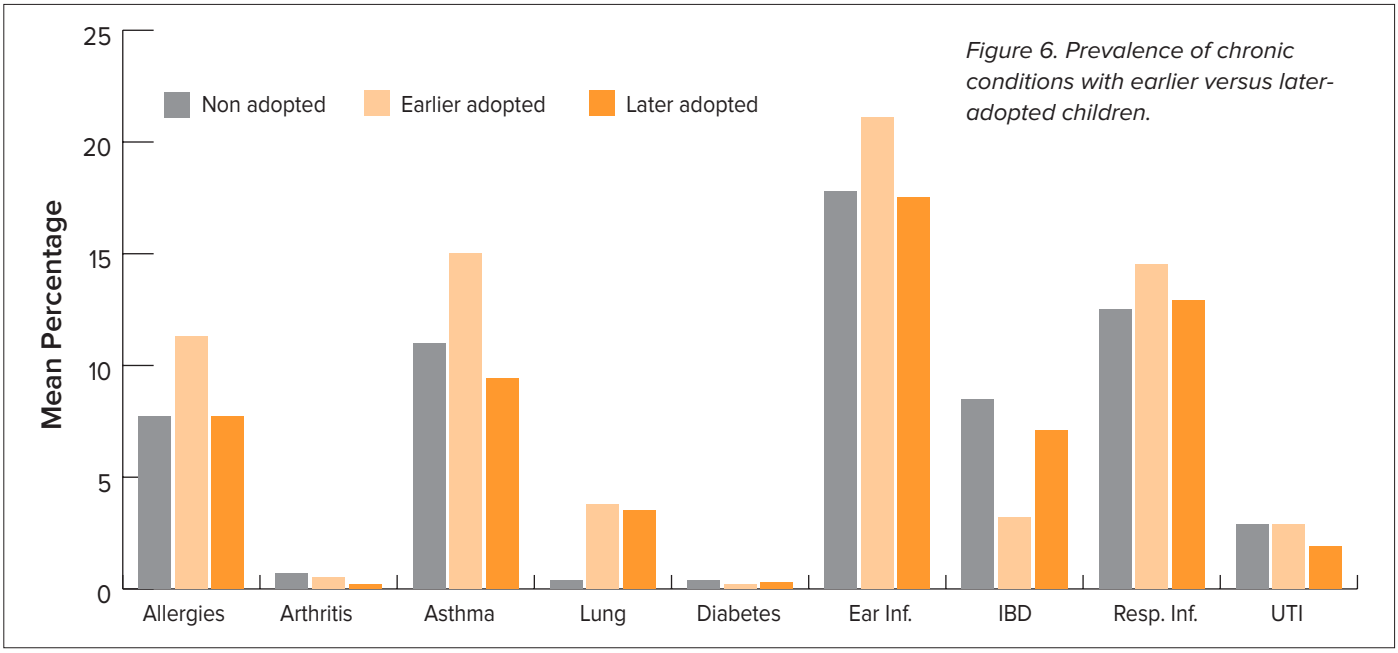
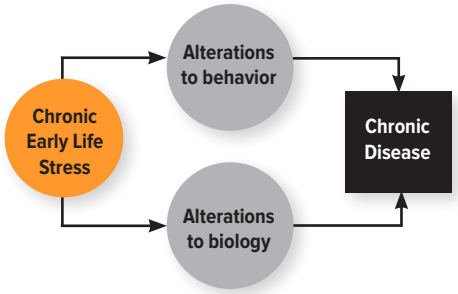


Figure 6. Prevalence of chronic conditions with earlier versus later-adopted children.

which, over time, can increase the risk for chronic conditions.



Jena Doom, in her Immune story on page 13 about 5 and 6 years olds for whom she measured inflammation (CRP), reported that they did not have elevated CRP levels. But that doesn't mean that children adopted from harsh conditions will not be at greater risk for health problems.

To study the question of whether early life experiences influence long-term health outcomes, we pooled data we have collected from multiple studies over the past ten years so that we ended up with information on 1127 children (854 internationally adopted children, 272 non-adopted children). In all these earlier studies, we had asked parents to report their child's age, their child's age at adoption and birth region (if applicable), and whether their child had any of the following nine chronic conditions:

- Allergies
- Asthma
- Chronic or recurrent lung disease
- Diabetes
- Repeated and persistent ear infections
- Inflammatory bowel diseases (IBD)
- Repeated and persistent respiratory infections
- Repeated and persistent urinary tract infections (UTI)

When we compared prevalence rates of internationally adopted and non-adopted children, we found that internationally adopted children were more likely to have higher rates of almost every chronic condition, except for inflammatory bowel disease and urinary tract infections. However, we also noted that the increase in prevalence was due to a small percentage of increase, in all cases less than 10%.

To learn more about whether early experiences during critical time periods in development might influence health outcomes, we next compared prevalence rates of non-adopted children, children adopted at less than 12 months of age (earlier adopted), and children adopted after 12 months of age (later adopted).

Quite unexpectedly, we found that earlier (not later) adopted children had higher rates of several chronic conditions, and lower rates of inflammatory bowel disease, compared to later adopted children. For three conditions—asthma, ear infections, and inflammatory bowel disease—these group differences remained statistically significant, even after controlling for children's age of assessment, birth region, and gender.

How do we interpret these results? Honestly, at this point we are not sure. Notably, the effects we are seeing, while real, are not large and parents are reporting that most of the children are healthy. We are wondering, however, whether a dramatic shift in environments while the immune system is forming might be one explanation. We have lots more work to understand whether this finding is "real" or chance, whether we see it in other children who dramatically change environments in the first versus second or later years of life (as in immigrant children), and so on. Stay tuned.

Driven to Discover
To Want the Tough Conversation

Richard Lee studies how parents and children in racially mixed families talk about race and racism

For years, U of M psychology professor Richard Lee has studied family dynamics in the United States, and in particular families who have internationally adopted Korean children. While only about 5-10 percent of Koreans nationwide are adopted, in Minnesota that figure is estimated at around 50 percent.

As he became immersed in that community he noticed one thing in particular—that parents "really had a hard time knowing how to talk about ethnic and racial differences in the family," he says, "and how to help their kids deal with the racism in society that they're going to encounter, and are encountering."

"We're living in an increasing diverse society, a global world, where we need to know how to have these conversations in a constructive, productive way, and if we can't figure that out in a family, how are we going to figure it out in a larger context?"

He says parents have the tendency to sit back and wait for their children to bring up issues of race and ethnicity when they're older, but kids can sense that hesitancy, and the conversations either happen too late or not at all.

Intervening early can make a big difference. "Our research is showing that that's when it plays a really important role in the child's adjustment and in their identity development," Lee says. Wait too long, and either the damage is done "or your relationship with your child is so tenuous at that point that you're not going to be able to connect with them."

A recent project of Lee's is looking at how adopted individuals who are now parents themselves are approaching these questions with their own children. "They are beginning to confront these issues and are more empowered, and there's a trickle-down to that," he says.

"In the future our society is going to be more racially diverse and mixed in families and in friendships and in the workplace," he adds. "That's why it's so important to figure out how to have these conversations. The issues around race and racism don't go away because society is more diverse.

Lee remains driven in his work, in part because of its ramifications for the greater community. "I love that the University supports me in the work that I do," he says. "I also love that we are starting to make more and more connections to the communities surrounding us."

Korean Adoptees as Parents

By Xiang Zhou, JaeRan Kim, Heewon Lee, and Richard M. Lee

> *"... when you parent as a Korean adoptee, that you actually, sort of* **go through the whole adoption experience again**... *each time your child is at a milestone or there's some particular event it makes you recall those same feelings or that same experience from when you were a child, but now as an adult, you can process it differently. You can think about it differently. Um, so it's actually like experiencing the whole adoption process* **a second time**.*"*

Because adoption is a lifelong process, it is important to investigate the ways in which international adoption affects individuals and families into adulthood, including parenthood. However, we know very little about the adult life experiences of adoptees. To address this research gap, in 2015, we interviewed 52 Korean adult adoptees who are parents with at least one child between 3–18 years-old. We were specifically interested in learning about how they —as transnational, transracial adoptees themselves—talk about ethnicity, race, and adoption with their children and partners. The majority of these parents we interviewed were mothers, along with three fathers. Most parents had biological children, though ten parents had adopted children.

Many of the Korean adoptee parents shared similar stories as the one quoted above. That is, Korean adoptee parents sometimes re-experience each stage of adoption at each developmental milestone of their children. Many parents shared with us that they felt more at peace about adoption after becoming a parent, as well as developing more empathy for both birth parents and adoptive parents.

We specifically identified four overarching themes from these interviews that reveal a wide range of identity formation and parenting practices. First, as parents and adults, they reflected on their lived experiences of the transracial, transnational adoption paradox—being a person of color yet raised in a White family. Second, they described how these transracial, transnational adoption experiences shaped their beliefs and decisions in family formation. Parents talked about how being adopted has affected their choice to adopt or to have biological children of their own. Third, they shared their beliefs about cultural socialization or the ways parents pass down ethnic and racial values, beliefs, customs, and behaviors to the child. For example, some parents talked about how they are learning about Korean culture and heritage along with their children. Last, parents shared how their adoption experiences influence parenting and how parents choose to engage in the conversation about adoption.

These four themes reflect different stages of a parenting journey for Korean adult adoptees. Figure 7 at the bottom shows how parents transitioned from internal reflections and beliefs (Theme 1: Beyond the Paradox), bridged by the family formation process (Theme 2: From Me to We), to their current parenting practices around race, ethnicity (Theme 3: Cultural Socialization) and adoption (Theme 4: Parenting as Adoptee). These preliminary findings were presented at the 5th International Conference on Adoption Research in New Zealand (Zhou, Kim, Lee, & Lee, 2016). We are now undergoing a more thorough coding process to develop a nuanced understanding of what these parents have shared with us.

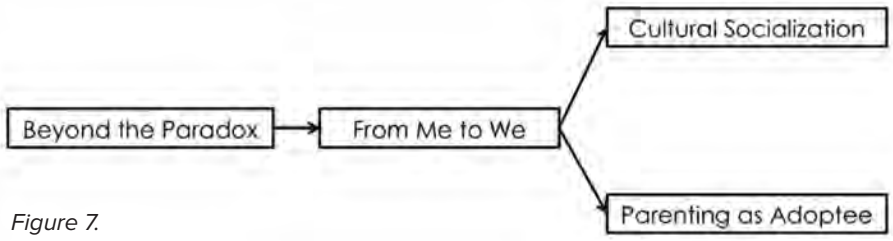


Figure 7.

Understanding Birth Family Thoughts among Adopted Korean Americans

By Adam J. Beaupre, Richard M. Lee, Oh Myo Kim

Throughout life, adopted persons are likely to think about the circumstances that led to their adoption. These thoughts are part of normative development and help adopted individuals to develop a coherent adoption narrative that includes how they think and feel about their adoption, their race/ethnicity, and their unknown genetic ancestry. Over the years, researchers have studied how adopted persons make sense of their adoption and develop ethnic identities. However, there is limited research on how adopted individuals think about their unknown genetic ancestry and specifically their birth family, and what role these birth family thoughts may play in their development and adjustment.

To address this gap in the literature, we first developed the Birth Family Thoughts Scale to measure the extent to which adopted individuals think about their genetic ancestry (i.e., birth parents, birth siblings, Korean name, etc.). We then investigated these birth family thoughts in two separate samples of adopted Korean Americans: 120 adolescents from the Korean Adoption Project Follow-up Survey (completed in 2014), and 127 adults from a separate survey of adopted Korean Americans.

Our findings from these surveys indicate that while there are many different ways in which adopted Korean Americans think about their birth family and cultural heritage, they do tend to think about these topics. Prompted with the following statement, "Please rate how much you agree with the following statements about birth family," both samples averaged between "neutral" and "agree" with the adults reporting significantly stronger agreement than the adolescents (see Figure 8). Further, both samples included individuals at all points along the spectrum. Additionally, we found that birth family thoughts are related to but distinct from ethnic identity

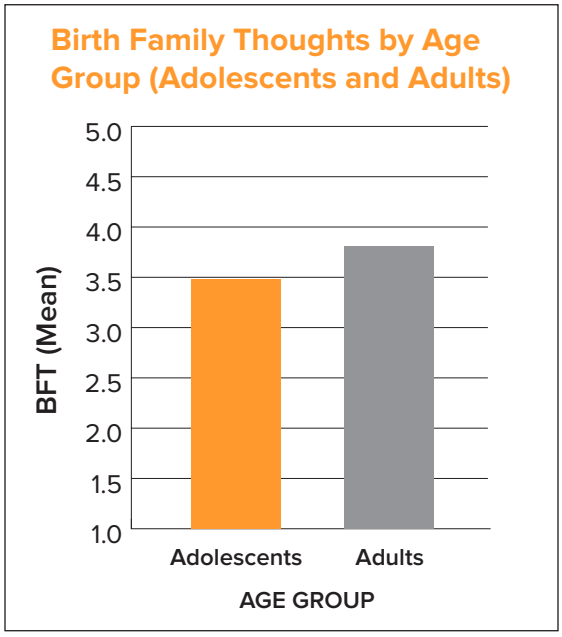


Figure 8. Participants responded on a 1-5 scale. 1: strongly disagree; 2: disagree; 3: neutral; 4: agree; 5: strongly agree

and adoptive identity. It makes sense that these experiences are related to one another as thinking about one naturally can lead to thoughts about the other.

Among the adolescent sample of adopted Korean Americans, we found that birth family thoughts are not related to the quality of an adopted person's relationship with adoptive parents. That is, having more conflict with parents does not make you think more or less about birth family. Similarly, having parents who are very involved in your life does not make you think more or less about birth family. These findings support the idea that birth family thoughts are normative and not a result of family functioning.

Because these are correlational findings, we cannot make any conclusions about cause and effect. But this new measure of birth family thoughts allows us to begin to explore how adopted persons make sense of their unknown genetic ancestry and incorporate it into their overall adoption narrative.

The Immune System, Growth, and Cognitive Development

By Jena Doom

I worked with the International Adoption Clinic to follow-up a group of internationally adopted and non-adopted children in a study done in the pediatrics department that they called "The Gerber Study". The international adoption clinic had information on the adopted children when they first came into their families. In this study, I followed-up when the kids were 5 and 6 years old. I was interested in their physical growth, their fat and lean body mass, their risk for obesity, and the levels of inflammation in their blood. There is some evidence that children growing up under harsh conditions (poverty, harsh parenting and perhaps orphanages) start producing higher levels of inflammation. That is, their immune systems acts as if it is always under threat. We can measure the levels of inflammation by taking a small finger-stick blood sample and assaying it for something called C-reactive protein or CRP. We compared the internationally-adopted children to children born into families of the same education and income as families who adopt internationally.

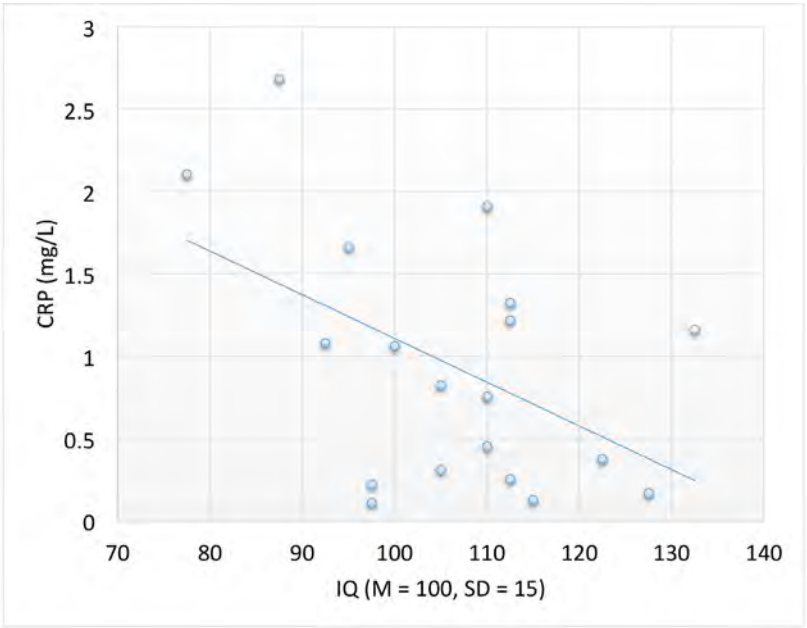


Figure 9. Children with lower IQ scores was found to have higher inflammation.

The encouraging news for the internationally adopted children is that we did not find that they had higher CRP levels than the non-adopted children. We also found that the adopted and the non-adopted children were similar in lean and fat body mass and both groups were well into the healthy range. We did find that the adopted children, while they had caught up in height and weight from the time they were adopted were still a bit shorter and lighter than the non-adopted children. Of course, because these children were only 5 and 6 years old, we cannot say that they will never be at greater risk for inflammation and being overweight. However, in the Puberty Study that Dr. Gunnar is currently conducting should answer whether children adopted internationally remain in a healthy weight-for-height range as they transition into their teen years,

Immune System, to page 14

Immune System, from page 13

which so far appears to be the case (see Puberty Study story on page 2).

Because I had also measured the children's IQ, I decided to examine whether either CRPs or lean body mass and height were related to IQ. These were just exploratory analyses, so the results should be taken with caution. However, I did find that children who scored *lower* on the IQ test had more inflammation, were shorter and had less lean body mass. These findings are shown in the three figures and they hold for both the adopted and non-adopted children.

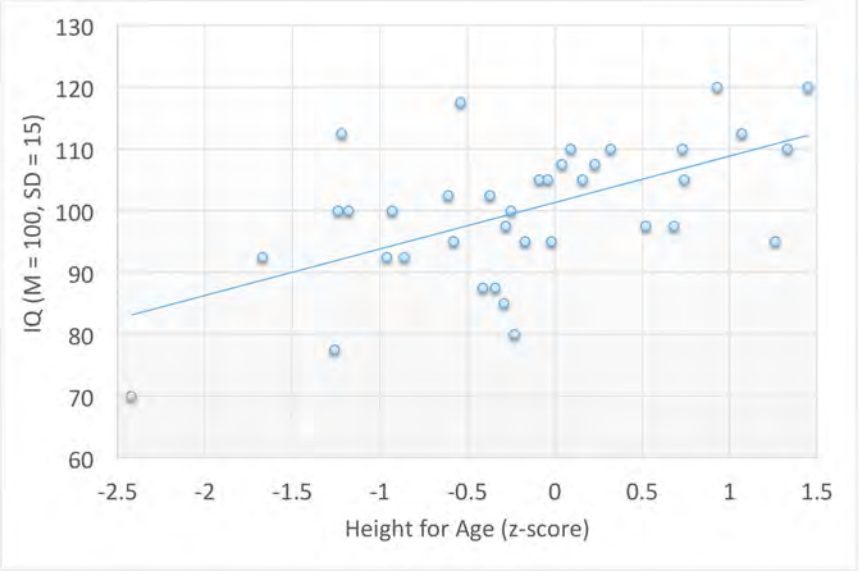


Figure 10. Children with lower IQ score was found to be shorter in height.

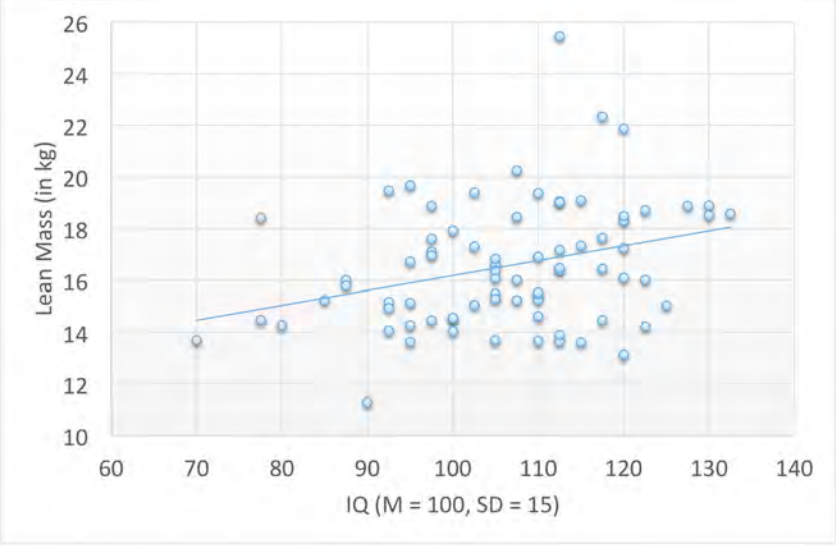


Figure 11. Children with lower IQ score was found to have less lean body mass.

More findings from the Transition into the Family Study

By Megan Gunnar, Clio Pitula, and Carrie DePasquale

We are continuing to analyze the wealth of information that we obtained during the Transition into the Family Study. This was a study in which we followed children adopted from institutional care when they were toddlers (i.e., between 18–36 months old) from shortly after they arrived in their families until kindergarten. We compared these children to ones adopted earlier without much if any experience in institutions and to children born and raised in their families in Minnesota.

In past newsletters we have described both the children's rapid catch-up in cognition and emotional behavior and their rapid formation of attachment to their new parents. We have also described the challenges that some of them face in developing the ability to wait for rewards, hold things in working memory, and control their attention. Finally, we have reported that their hormonal stress system tends, on average, to be less reactive and to produce less of the hormone cortisol. Those children whose hormonal stress system is the most "blunted" tend to also be the ones who parents describe as having received less attention from caregivers in the orphanages and who are struggling the most in controlling their attention and activity levels.

Autonomic Nervous System: This last year we finished processing and analyzing the heart rate data we collected while the children watched a calming video at several of our assessments over the first two years of our testing. From the heart rate data we were able to separately look at activity of the two sides of the autonomic nervous system: sympathetic and parasympathetic. The sympathetic system is often thought of as the "go" side of the nervous system, while the parasympathetic is thought of as the "rest and digest" side. This is a vast over simplification, of course. The parasympathetic system is measured by looking at the variation in the time between each heart beat that occurs naturally as we breathe in and out. It is called respiratory sinus arrhythmia (RSA). The sympathetic side of the nervous system controls the time between the signal for the heart to beat and the opening of the aortic valve. This is called PEP or pre-ejection period. Higher RSA means more parasympathetic control of the heart. Most of the changes in heart rate during our everyday existence is due to increasing (slows down heart rate) and decreasing (speeds up heart rate) the amount of parasympathetic input to the heart. Higher PEP means the intervals between the signal to beat and the actual beat of the heart is slower and thus there is less sympathetic input. As sympathetic input to the heart increases, that interval shortens and you get lower PEP scores.

We found that RSA (parasympathetic, rest and digest) did not differ between the children just adopted from institutional care and children in our other two groups. For all of the children, with each assessment as they became more familiar with our testing situation and got older, RSA

Family Study, to page 16

Family Study, from page 15

they became more familiar with our testing situation and got older, RSA increased. That is, we found that early institutional care and the lack of having a family in infancy had no effect on this side of the nervous system (see Figure 12). The story was different for the sympathetic side. For the sympathetic side, children who were recently adopted from institutional care had lower PEP meaning higher sympathetic input to the heart. It took a year and a half for their sympathetic activity to slow down to the average levels we noted for the other children. That is, PEP increased over the first three assessments (1.5 years) meaning sympathetic input was lower and lower. Importantly, we also found that the children with the lowest PEP scores (highest sympathetic activity) at the first assessment were the ones whose parents reported had more behavior problems at our fourth assessment when the children were between 2.5 and 5 years of age. This was two years post adoption for the children adopted from institutions.

On the whole, these data on the sympathetic and parasympathetic nervous systems seem to reveal the important recovery that children experience when they have the opportunity to live in a loving family. They also point, however, to the possibility that we can develop methods of identifying, soon after arrival, the children who might need extra help in getting back on track.

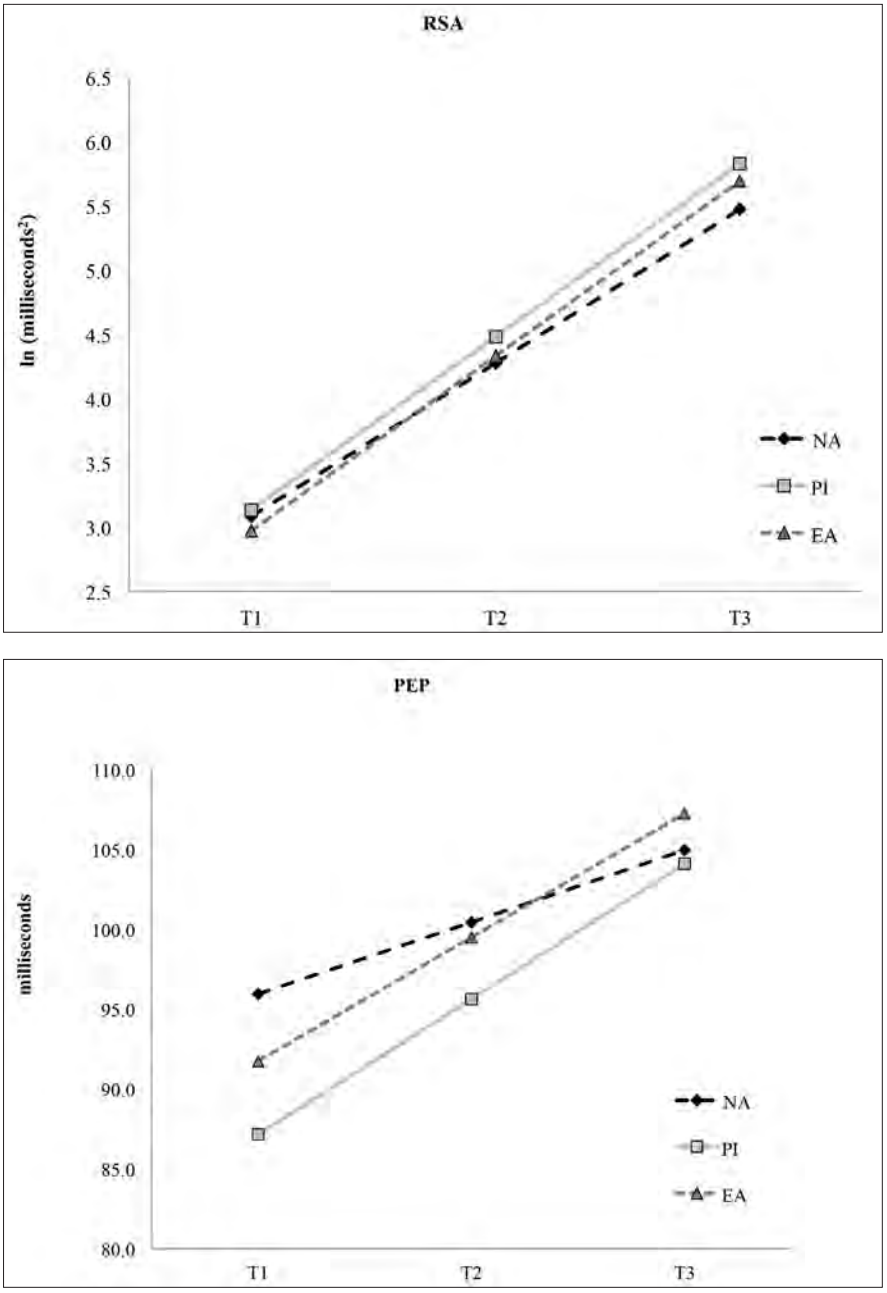


Figure 12. Trajectories of parasympathetic and sympathetic nervous system activity among post-institutionalized (PI), post-foster care (PFC), and non-adopted (NA) children.

Kindergarten Findings: We are deep into analyzing the results we obtained from the kindergarten observations we made as part of the Transition into the Family Study. Our results have shown us that, on the whole, most of the children were doing well in kindergarten. Some were struggling, though. One area we are very interested in is how the children are doing in making friends and getting along with other children.

We know from past research that children's relationships with their peers are very important. For instance, through interactions with other children, important skills such as cooperation and conflict management are learned. Moreover, healthy peer relationships in childhood predict positive mental health outcomes, and problems with peer relationships predict later difficulties in school and at home. In our research, we have previously found that, as teenagers,

internationally adopted youth are more likely to experience social problems including victimization and rejection by peers. We reasoned that it was possible that, on the one hand, these difficulties had started earlier in childhood, or on the other hand, that they had begun when our participants reached adolescence, a time when social interactions become more complicated and nuanced. However, there were very few studies that had asked about peer functioning among young, internationally adopted children, so we didn't know which of these two possibilities was closer to the truth. Thanks to the kindergarten observations, we were able to pursue this question.

A total of 146 children participated in the kindergarten assessment, including 64 children adopted internationally from institutions, 40 children adopted from foster care, and 42 children born and raised in their biological families in Minnesota. To investigate peer relationships, we asked parents and teachers to provide ratings of their children's social functioning on long questionnaire measures. We asked about behaviors directed towards peers such as aggression, helping and sharing, and about experiences with peers like being the victim of aggression and being excluded or rejected from play. In addition, members of our lab who were trained on a coding protocol visited children in their kindergarten classrooms during the school year. Without knowing whether children were internationally adopted or not, our coders observed and rated a number of peer behaviors and experiences for each child. This means that we were able to obtain three different perspectives on how each child is doing socially.

Our results showed us that, according to their teachers and to our trained observers, internationally adopted children, particularly those adopted from institutions, were more likely to have difficulties with peers (i.e., victimized, rejected, less integrated into social group, lower social skills) than were non-adopted children. Further, these problems with peers, as rated by teachers, appeared to be partly accounted for by children's performance on an inhibitory control task they completed in our lab one year earlier. Inhibitory control refers to children's ability to control inappropriate responses by inhibiting an automatic behavior. Children whose inhibitory control is slower to develop may struggle with peers because they are less likely to inhibit antisocial behaviors in favor of more positive ones and more likely to invade peers' personal space, for instance. Notably, when we looked at parents, we did not find a significant difference between adopted and non-adopted children. This may suggest that internationally adopted children are doing better in relationships with peers outside of school, such as with neighbors, family friends, and relatives.

Research Opportunity: Follow-up to the Transition into the Family Study

Seeking: Families who previously participated in any portion of the Transition into the Family Study, whose children are currently between the ages of 8 and 11 years.

Middle childhood is a time when children start to gain more independence, and peer interactions become more complex. Building on the Transition into the Family Study Kindergarten assessment, we are interested in how older children interact with unfamiliar peers, and how early life experiences may influence these interactions.

Your child would be asked to visit the University of Minnesota campus one time and participate in various tasks with another child his or her age. Eligible participants will receive up to $20–$40 compensation and free parking. For more information please contact Carrie DePasquale at 732-864-7953 or email depas010@umn.edu.

Research Opportunities

The Immune Study: Ages 14–20 Needed

Every day we are learning more about how childhood sets up trajectories of health and well-being. However, we have much more to learn. This summer we are taking the next step in that direction with the start of our new Immune study. This project is in collaboration with Dr. Chris Coe, an expert in psychoneuroimmunology who conducts research at UW Madison. With this study we will examine how differences in early experiences are associated with differences in functioning of actual immune cells. To do this, we will be collecting blood samples from internationally adopted and non-adopted adolescents and young adults. Dr. Coe will isolate immune cells from these blood samples, and examine how they respond to various immune system challenges, like viruses or pollen, in a test tube. Participants will complete some questionnaires and saliva samples at home, and visit us at the U of MN to give a blood sample and have their temperature and blood pressure

taken. They will be compensated up to $50 for participating. If you are interested in learning more about the Immune Study, email us at immune.umn@gmail.com.

Share your U.S.-Russian Adoption Experiences

Families with children ages 10 and older are invited to participate in an interview study to share your perspective about the experience of adoption from Russia. We hope to better understand the adoption stories of adoptees from Russia and adoptive family members in terms of how they form family ties and find connections to the U.S. and Russia following international adoption. We want to interview U.S.-Russian adoptees and adoptive families in light of the 2013 moratorium on further adoptions between these two countries.

Participation eligibility:

- You were adopted internationally from Russia as a child and are currently 10 years or older.
- You are a parent of a child or children adopted from Russia.

Each participant and parent will receive $20 for participating in the study. Time and location of the interview is flexible. For more information please email Lisa Gulya at guly0003@umn.edu. This study is directed by Lisa Gulya, doctoral candidate in the Department of Sociology at the University of Minnesota, in collaboration with the International Adoption Project. IRB#1509P78122.

Congratulations to the University of Minnesota Adoption Medicine Clinic on the Celebration of its 30th Anniversary!

The Adoption Medicine Clinic's mission is to support families through the adoption process and help adoptive children overcome the challenges of early adversity.

To learn more about the services at the Adoption Medicine Clinic visit: https://childrens.mhealth.org/care/overarching-care/adoption-medicine-pediatrics

Adoption Medicine Clinic Therapists: Susan Jacobsen, Physical Therapist, and Megan Bresnahan, Occupational Therapist.

Adoption Medicine Clinic Doctors and Staff (left to right): Laura Jean, MPA, Judith Eckerle, MD, Dana Johnson, MD, PhD, Cynthia Howard, MD, Maria Kroupina, PhD, Kimara Gustafson, MD, Angelita Soto, RN, and Deb Seyfer Administrative Support.

GUNNAR LAB AND IAP STAFF

INVESTIGATORS
Megan Gunnar, Institute of Child Development
Richard Lee, Psychology
Brad Miller, University of MN Masonic Children's Hospital

STAFF
Jennifer Armerding, Clinical Interviewer
Meg Bale, PR Coordinator
Carrie DePasquale, Graduate Student
Christopher Desjardins, Research Associate
Bonny Donzella, Senior Research Fellow
Jena Doom, Graduate Student
Colleen Doyle, Graduate Student
Jan Goodwalt, Registered Nurse
Terri Jones, Registered Nurse
Alyssa Miller, Senior Lab Tech
Shanna Mliner, Senior Research Fellow
Bao Moua, Principle Lab Tech
Lea Neumann, Senior Lab Tech
Melissa Stoll, Registered Nurse
Heather Taylor, Undergraduate Student
Brie Reid, Graduate Student

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

COLLABORATORS
Center for Neurobehavioral Development
University of Minnesota Health Adoption Medicine Clinic
Institute of Child Development

DESIGNER
Heewon Lee

ONLINE EDITION
www.cehd.umn.edu/ICD/research/gunnarlab

Gunnar Lab newsletter is published annually by the University of Minnesota Institute of Child Development for families who have partnered with us in our research work. Correspondences can be sent to Gunnar Lab, 51 East River Road, Minneapolis, MN 55455. For address corrections, please contact us at 612-626-8949 or IAP@umn.edu.

Collaborations & Partnerships

GUNNAR LAB
Institute of Child
Development
University of Minnesota
51 East River Road
Minneapolis, MN 55455

Return Service Requested