



SUMMER 2017: NEWS FROM THE UNIVERSITY OF MINNESOTA

Gunnar Lab for Developmental Psychobiology Research



Greetings from Professor Megan Gunnar

The Gunnar Lab research team continues to study the impact of early experiences through our work with families formed through international adoption and Minnesota-born families. Much of our work over the past year focused on the development of children, teens and also young adults. I am especially grateful for the work of Professor Rich Lee and his students in the Familee Lab who work with young adults who were adopted from Korea. Rich's work helps us understand the experience of international adoption as it relates to identity and the experience of discrimination.

The overall goal of the Gunnar Lab's research is to study stress and the experiences that shape how the body deals with stress. In this



newsletter issue, you can read more about our latest research studies examining stress during pregnancy and its effect on the developing fetus, stress during the transition to adolescence, a very challenging time of life, and stress encountered in social situations where children attempt to meet and work with new peers.

Much of our stress work is taking a medical turn as we evaluate the health and physical development consequences of starting our life in harsh and stressful conditions as is the case for many children adopted internationally from orphanages.

Thank you to all the families who have taken part in our research.

- Regents Professor Megan Gunnar

Puberty Study: Growth and Pubertal Development

By Brie Reid

Throughout evolution, humans have experienced periods of feast and famine. Growing evidence suggests that adversity and height growth stunting early in childhood increases risk for early onset puberty (in girls), obesity, and poorer mental health later in life. Researchers think that this is the case because in the first 1,000 days after conception, our very young, growing bodies determine whether the environment we are growing up in has a lot of resources or has little resources. In this way, our bodies “calibrate” to the environment we expect to grow up in. However, researchers think that early physical adaptations to harsh environments with very little resources may increase later risks of obesity, early onset puberty in girls and metabolic syndrome and cardiovascular disease, because our bodies do not anticipate a shift from resource-poor to resource-rich environments.

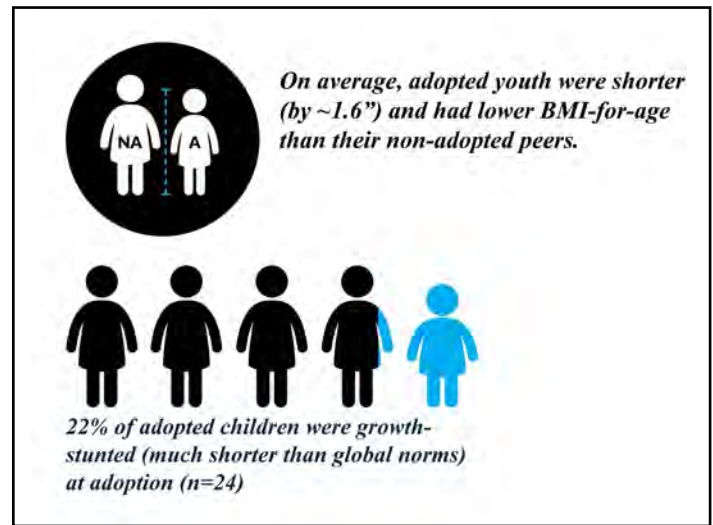
We tested this hypothesis with 283 youth aged 7-14 years who participated in the first year of the Puberty Study. We looked at data collected from adopted children’s first medical clinic visit post-adoption and we also looked at data collected from the nurse’s exam, see Figure 1, in the Puberty Study.

Growth

On average, adopted youth were shorter (by ~1.6”) and had lower BMI-for-age than their non-adopted peers. Adopted youth also tended to have lower numbers of body fat percentage. On average, both groups of youth were within normal ranges of height, weight, and body fat. There were no differences in waist-to-hip ratios or waist-to-height ratios between groups. A key finding was that there were very few overweight or obese youth in either the adopted or the non-adopted group, which surprised us because nearly one in three children ages 10 to 17 are overweight or obese in America.

Pubertal Development

We found that pubertal status was determined by being older and being heavier for your age. This is just



A key finding was that there were very few overweight or obese youth in either the adopted or the non-adopted group, which surprised us because nearly one in three children ages 10 to 17 are overweight or obese in America.

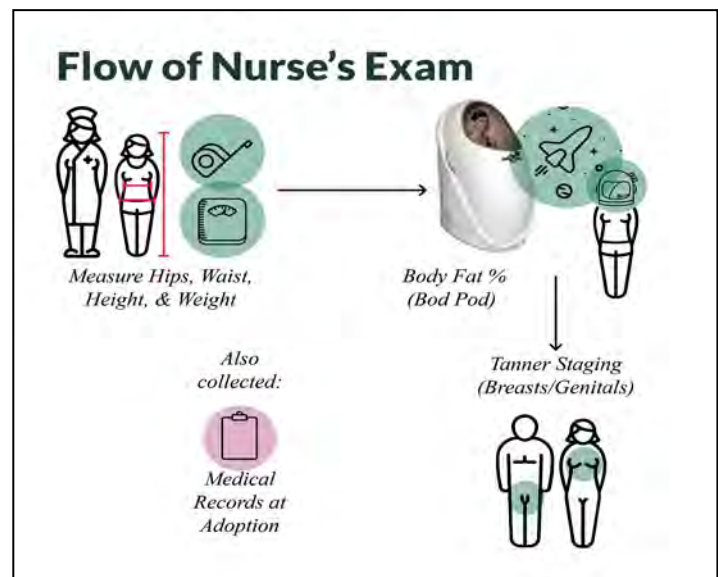
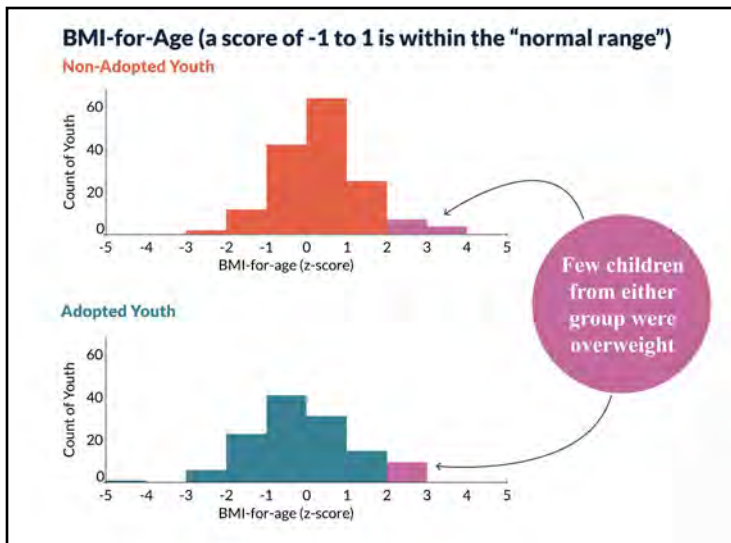


Figure 1. Nurses measure participant's growth using different methods.



No Difference in Menarche



16 girls were menarcheal; Mean age of menarche onset: 11.7 years \pm 1.64



23 girls were menarcheal; Mean age of menarche onset: 12.09 years \pm 1.29

Figure 2. No group difference in pubertal development between adoptees and MN born participants.

Early life adversity
and height-growth stunting
early in life do not always lead to
early puberty or obesity in later
childhood or adolescence!

what is expected as bodies typically put on fat to support the pubertal changes in growth. What surprised us is that we found no evidence that the internationally adopted children, many of whom had experienced relatively harsh conditions in orphanages prior to adoption, were going through puberty earlier than the children born into their Minnesota family as seen in Figure 2. We did not see this for either boys or girls.

Previously Height Stunted Adopted Youth Results

Previously height-stunted youth adopted internationally, though still shorter on average, were not found to be at greater risk for high BMI and were also less likely to be in later puberty stages.

Our conclusion?

Early life adversity and height-growth stunting early in life do not always lead to early puberty or obesity in later childhood or adolescence!

Early removal from adversity or later contexts of highly-resourced homes could protect children from long-term impacts on their BMI and the timing of puberty. Subsequent waves of longitudinal data collection will provide a window into pubertal timing across three years to determine if adopted and previously height-stunted youth experience a different pubertal development tempo than non-adopted peers. This tempo could also impact body fat as our sample of participants get older.

Multiple years of follow-up and more precise measures of where children store fat on their bodies and metabolic health are our next steps to ensure we understand the full picture of growth and pubertal development in the context of early challenging life conditions.



Recalibrating With a Physiological Cup o' Joe

By Keira Leneman

While we all may experience varying degrees of struggle in getting out of bed and starting the day, our body helps do some of the work for us. Shortly before our eyes open and in the minutes following, a stress hormone called cortisol influences this routine process. The body releases cortisol in response to stressful events, but also regularly throughout the day in a circadian rhythm cycle. Levels are highest early in the morning and then drop throughout the day to the lowest levels in the first half of the night. The cortisol awakening response (CAR) is superimposed on top of the day-night rhythm of cortisol. It consists of a spike in cortisol levels within the first 30-45 minutes after awakening and is considered by some to be a type of

preparation for the day, like a cup of coffee. Using saliva samples collected by families in their homes, we are able to gather information about how stress systems might function differently on an everyday basis in children who spent some of their early months living in orphanages before being adopted compared to children born into their Minnesota families.

A few years ago our research group examined children at the transition to adolescence and found that early in puberty, children adopted from orphanages had more blunted CARs (less pronounced rise in the morning) than non-adopted children. However, when older and farther along in puberty, the adolescents adopted at a

younger age had CAR patterns similar to the non-adopted group—they were no longer blunted. This data suggested that puberty might provide a period for recalibration of physiological stress systems, especially when early life adversity was experienced for only a short period of time.

In the Puberty Study, we again collected saliva samples in the time right after waking up. We have only looked at the data from the first year of our study, but are seeing some hints at similar patterns. We have found that as children progress in puberty they show larger “spikes” in cortisol when they wake up. We then examined whether spending your early life in an orphanage affected this cortisol

response to awakening. As we had seen before in previous studies, Figure 3 shows that children adopted later (16 months or older) had a smaller spike in cortisol after awakening than children adopted earlier in life (before 16 months) or those born into their families in Minnesota.

So far we have not seen a cortisol awakening response change with puberty, but it is still a possibility as the children in this study get older and are more advanced in pubertal development. As we begin to analyze data from year 2 and year 3, we will be able to look at a wider range of pubertal status to get a better sense whether these patterns are changing throughout this developmental period. Year 2 is almost complete, so we should be able to begin the next level of these analyses shortly.

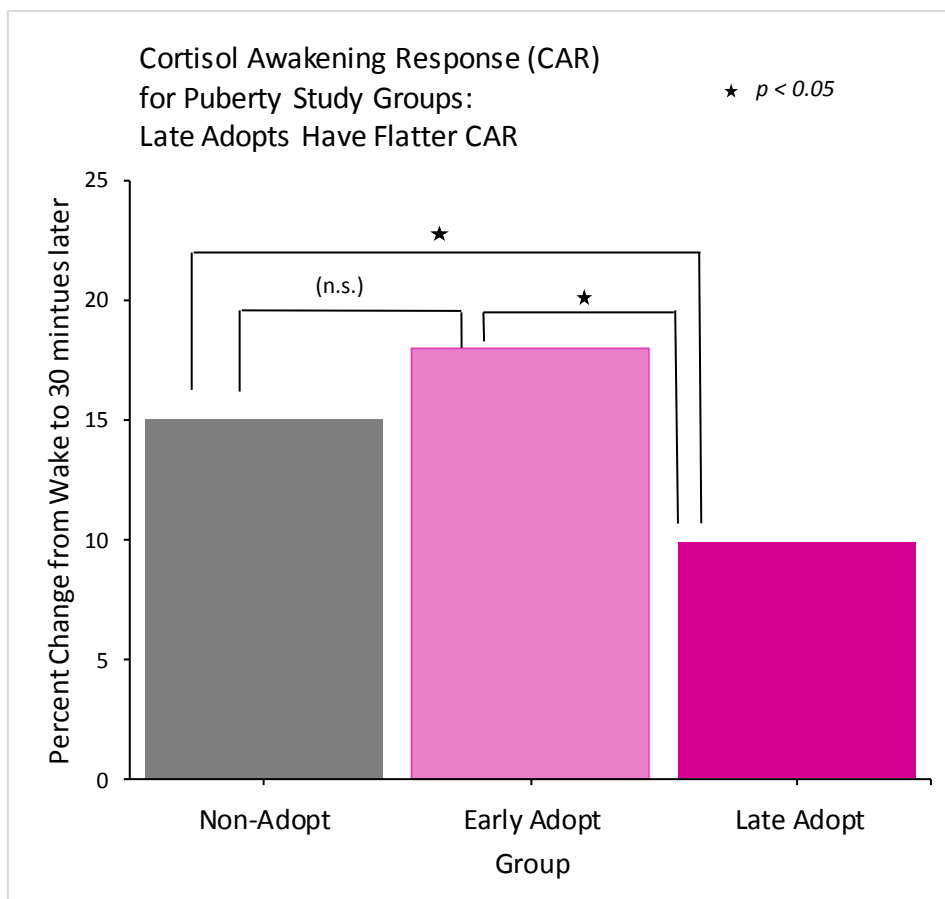


Figure 3. Group differences in Cortisol Awakening Response.

Investigating the Brain's Response to Stress

By Max Herzberg

We often take it for granted that different people respond to stress in unique ways. How adolescent's brains and bodies react to social stress, however, is not yet well understood. When we experience stressful circumstances our bodies produce a hormone called cortisol that helps us to respond appropriately to the source of stress. Research in adults has shown that only about 60% of people produce more cortisol in response to social stress, while the other 40% do not. These researchers have suggested that these differences are related to different patterns of activation in the brain. We are interested in finding out if patterns of brain activation are different in youth who produce a cortisol response compared to those who do not.

Recently our research group has begun a project to answer this question and investigate the differences between adolescents who produce cortisol in response to stress and adolescents who do not. We developed a new social stress test to be used in an MRI scanner. To ensure that the social stress tasks will work in the scanner, we completed a preliminary study in an MRI simulator. Twenty-two adolescents, ages 11-14 years old, came to the University to participate in our preliminary study. Some of the youths gave a speech about themselves to a pair of judges and then solved math problems out loud, while other youths completed the speech and then answered multiple choice math problems on a screen in the simulator.

Our results indicate that, like adults, not all adolescents produce cortisol in response to giving a speech and doing some math. As expected, approximately 60% of the participants we tested displayed a cortisol response, while the other 40% did not. We call these groups "Responders" and "Non-Responders", respectively. Figure 4 shows the group-level cortisol

response to our social stress test, with both the Responder and Non-Responder groups represented. To follow up on these results we will be starting a full-scale neuroimaging study to investigate differences in brain activation between Responders and Non-Responders this summer.

We will investigate whether brain activity during stress tasks can explain differences between individual's responses or if patterns of brain activity before and after stress better explain individual differences. Another possible use of our new imaging test will be to investigate whether or not having the support of a parent, friend, or stranger changes the response of the brain and body to stress. This project, and possible future studies, is our first attempt to discover the brain activation in response to stress in adolescents, so we have a lot to learn about the future applications of our findings and how they will inform our understanding of the developing stress system.

To help us learn more about adolescent's brain response to stress, we encourage families with children 11-14 years old to participate in the Minnesota Imaging Stress Test in Children (MISTiC) Study. Please contact Max Herzberg at mistic.umn@gmail.com

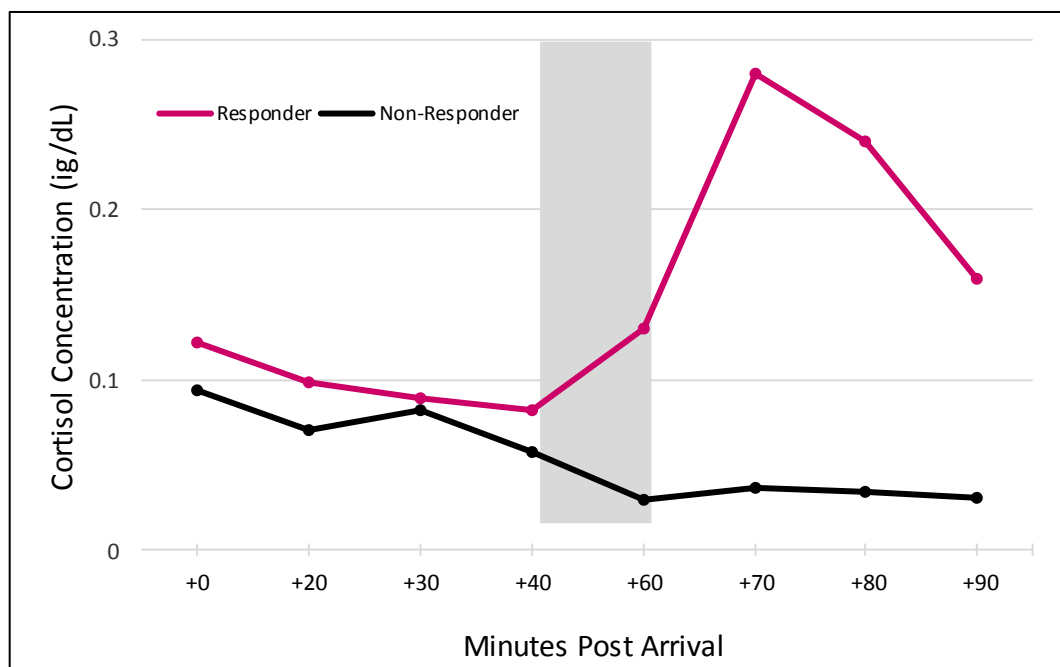


Figure 4. Group cortisol concentrations across the session. Approximately 60% of participants belong to the Responder group. The gray rectangle represents the time period during which participants delivered their speech and completed the math task.

Update from the Peer Competence Follow-up of the Transition into the Family Study

By Carrie DePasquale

As we have reported to you in previous newsletters, we found that some of the children adopted internationally in the Transition into the Family had “underactive” stress-regulatory system functioning for their first few years after adoption. This was based on activity of the stress-response system that produces cortisol. We also reported in previous newsletters that those children with more “hypoactive” stress-regulation were also more likely to have difficulty with peers when they were in kindergarten according to their teachers. Here we are following up this finding when the children are 8-11 years old. We invite each child to our research lab and pair them with a child of the same age and sex who was not in the Transition into the Family Study. We then have the children play games together to examine their competence with new peers.

Additionally, underactive stress-regulation in the first few years after adoption did not predict any differences in peer competence in this study.

Thirty-two pairs of children have participated in the study so far. Figure 5 shows their average scores on a scale from 1-5 (higher scores representing higher interaction quality, more positive affect, and more conflict, respectively). We were pleased to discover that children adopted internationally (the “PI” group) interacted just as well, showed just as much positive affect, and had just as little conflict as their non-adopted peers (the “NA” group). Additionally, underactive stress-regulation in the first few years after adoption did not predict any differences in peer competence in this study. However, this may be due to their underlying cortisol regulation. During this same interaction, we collected 3 saliva samples to measure cortisol over the course of the interaction. Figure 6 shows that children adopted internationally have almost identical patterns of cortisol compared to their non-adopted peers, however in the middle of the session

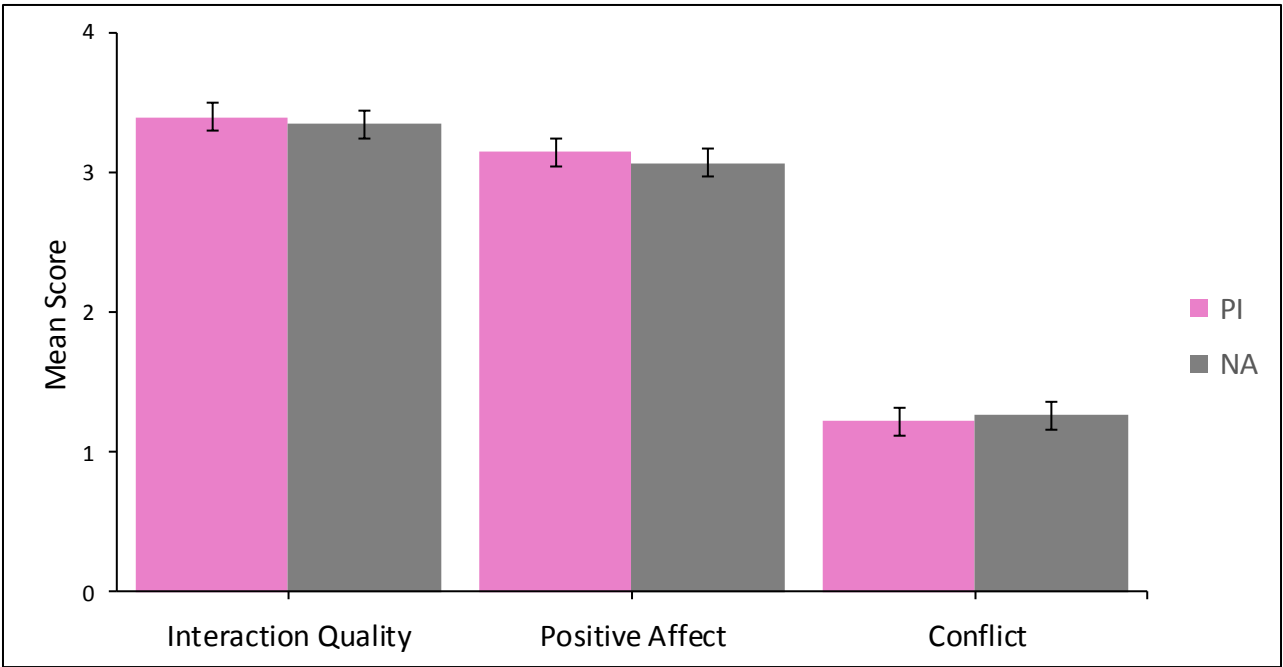


Figure 5. Average behavior scores during a social interaction with a new peer for children adopted internationally (PI) and non-adopted children (NA).

they show slightly higher levels. One possible explanation is that, although internationally adopted children show similar behaviors during social interactions, it takes more of their hormonal “resources” to achieve this.

We feel it is very important to gather more participants in order to ensure that this pattern is the true pattern, so please contact us at 732-864-7953 or depas010@umn.edu if you are interested in being a part of the study!

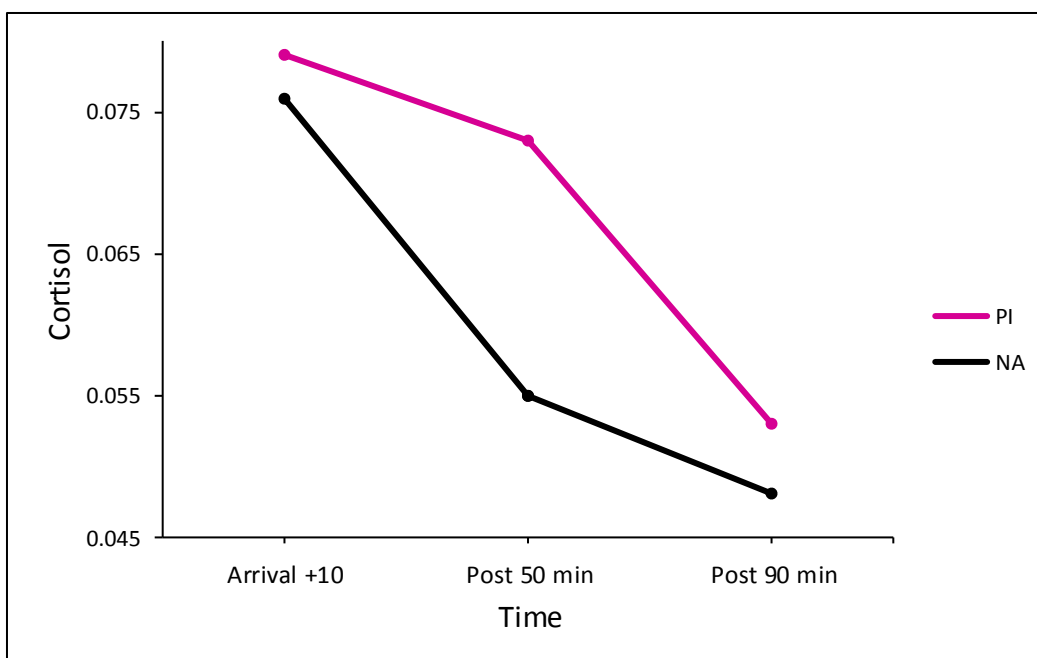


Figure 6. Cortisol patterns over the course of the social interactions for children adopted internationally (PI) and non-adopted children (NA).

PEER COMPETENCE 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 Kindergarten study, 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 U of MN campus one time over the summer 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 email Carrie at depas010@umn.edu or call 732-864-7953.



Parenting Results from the Transition into the Family Study



By Kalsea Koss and Jamie Lawler

Parents are the most important people in young children's lives. They comfort them, care for them, and help them learn and grow. Lots of research has shown how parenting affects kids raised in their families of origin, but we wanted to look in particular at parenting in internationally adopting families.

We wanted to see how it may be similar or different than other families and to see how parenting affects the recovery children make following adoption. Our team was especially interested in which aspects of parenting might help adopted kids learn to control their behavior and emotions. We also know that parenting is a hard job (maybe the hardest job of all!) and we were curious whether it was more challenging to parent a child who had tougher experiences before adoption. Finally, we wanted to see whether the

consistency of family routines, such as meal times and bedtimes, helped children learn better self-control.

What we did: We examined parenting and the family environment as part of the Transition into the Family Study. The Transition Study was a multi-year project following children adopted from institutions, seeing them every eight months for the first several years that they were 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. To look at parenting, we asked families to come to our research lab to participate in a number of different activities four times over the first two years post-adoption. Activities included playing normally as they would at home, structured play activities (like making a scene using Playdoh), and cleaning up toys

We were also curious how child behavior and parenting would affect one another in the first year following adoption and found that child behavior soon after adoption does NOT predict later parenting, but a parent's ability to provide structure and set limits soon after adoption predicts how children are able to regulate their behavior 8 months later.

together. We also asked parents to complete several daily diaries to get a sense of the typical day for the children at home. To measure how well children recovered following adoption, we looked at how well they could regulate their behavior when asked to transition between tasks at the four laboratory visits, how children performed on a number of tasks designed to challenge their attention and self-control, and asked parents and the child's kindergarten teachers to complete a number of questionnaires about their behavior and functioning.

Who participated:

145 families, including 93 families who had adopted a child internationally from an orphanage or other institution were part of this portion of the study. We also followed children adopted internationally from foster care situations, but these children and their families are not a part of this analysis.

What we found:

First, we looked at the quality of parenting received by children adopted out of institutions compared with children reared in their birth families. We found that parenting did not differ between the groups on either sensitivity (the parent's ability to respond effectively to the child's cues in a way that supports the child, encourages emotional development, and promotes the child's confidence that their needs will be met) or structure/limit-setting (the parent's ability to produce predictable experiences and expectations for the child as well as structure the child's behavior). We also found that both groups demonstrated above average parenting.

Second, we wanted to see whether children's pre-adoptive care would predict the parenting they received

after adoption. We found that children adopted from higher quality pre-adoptive care received higher rates of sensitivity and more effective structure/limit-setting from adoptive parents. This may be because these children were able to provide clearer signals of their needs and wants. We were also curious how child behavior and parenting would affect one another in the first year following adoption and found that child behavior soon after adoption does NOT predict later parenting, but a parent's ability to provide structure and set limits soon after adoption predicts how children are able to regulate their behavior 8 months later.

Next, we wanted to look past the first year after adoption and see how parenting affects children's self-control in kindergarten. We found that better parent structure/limit-setting predicted children's self-control on several different tasks. Children who had received more effective structure and limit-setting from parents were better able to control their impulses when asked to use their words rather than their hands to select a toy prize. They also did better on a computer game that asked them to pay attention to certain things and ignore others. These children also showed better ability to regulate their emotions in kindergarten.

Finally, children who receive poorer preadoption care are more likely to have lasting problems in impulse control and attention regulation. Because of this, we were interested in whether parenting might affect the connection between poor pre-adoptive care and later child functioning. We found that children who received high quality parenting did not show the same lasting effects of poor early care as children who

Children who had received more effective structure and limit-setting from parents were better able to control their impulses when asked to use their words rather than their hands to select a toy prize.

received less ideal parenting. Because parents in our study generally displayed "better than average" parenting, this finding suggests that children who experienced more adversity before adoption needed really good, not just good parenting in order to recover. For example, children whose parents scored really high in their ability to structure the environment and set limits showed good emotion regulation regardless of their pre-adoptive adversity, whereas children whose parents scored in the average range on these aspects of parenting struggled more in regulating their emotions if they had experienced more pre-adoption adversity. Additionally, children in families with very consistent daily routines (for example, the same meal times and bed times each day) who had experienced poor care before adoption showed better ability to wait for a surprise and showed fewer ADHD symptoms than children adopted from similar circumstances whose families had less consistency in routines. Consistent routines did not seem to help with indiscriminate friendliness. In fact, for children adopted from more adverse pre-adoption conditions, greater consistency in routines predicted more indiscriminate friendliness. We are not sure why this might be the case, but it does suggest that stability in routines may help some aspects of recovery from pre-adoption condition but slow others.

Women and Infants Study of Health, Emotions, and Stress (WISHES)

By Colleen Doyle

What makes us who we are?

Historically, great debate has surrounded this question. Some have said it's the genes we inherit at conception. Others have pointed to the environment we experience in childhood. Today, there is growing evidence that many of our individual characteristics—including our temperament, our intelligence, and our mental and physical health—may be influenced by the interplay of our genes and the prenatal environment that we experience before birth. The goal of our new WISHES study (the Women and Infants Study of Health, Emotions, and Stress) is to learn more about how women's experiences during pregnancy may "get under the skin" of their developing children to influence their brain development, behavior, and health.

Why are we studying prenatal experiences?

All women experience some amount of stress and mood swings during pregnancy. However, a growing body of research has linked different levels of these "prenatal stress" experiences to both positive and negative outcomes for women and their developing children. For example, mild levels of prenatal stress have been linked to enhanced motor and cognitive development in infancy. In contrast, more intense or chronic experiences of prenatal stress have been associated with increased risk for an earlier birth, as well as problems with learning and controlling emotions during childhood. The mechanisms that link women's experiences during pregnancy to long-term child outcomes are complicated and not completely understood. The goal of the WISHES study is to increase our understanding in this area. We think our study has the potential to make important contributions to how parents, pediatricians, and policy makers can help set up lifelong trajectories of health and well-being by supporting women's health during pregnancy.

What is prenatal stress?

Prenatal stress is a complex umbrella term that encompasses many experiences – from frustration with daily hassles, to mental health concerns related to anxiety or depression, to life circumstances that are difficult or impossible for women to control, such as significant financial concerns, the death of a loved one, or a disaster like flooding. Additionally, a woman's perception of whether something is stressful contributes to how she may experience prenatal stress. This means factors like a woman's personality, her outlook on life, and whether she views her world as safe or unsafe can come into play.

Finally, prenatal stress is not exclusive to the prenatal period. Research shows that women who report feeling stressed, anxious, or depressed during pregnancy also report feeling this way through at least the first two years of their child's life. This is important to remember, because this means there are potentially many opportunities to support women and their children.

Although the "prenatal stress recipe" can be different for every woman, we might think about the ingredients as being the sort of things that drive us "N.U.T.S.", in that these things are *Novel, Unpredictable, Threatening to our survival or our sense of self*, and they foster a *Sense of lacking control*. This acronym isn't meant to make light of prenatal stress, but rather to help us remember that prenatal stress occurs when a woman has more things coming at her than she can manage.

How does prenatal stress influence child development?

Recent research suggests that experiences of prenatal stress might influence child outcomes by impacting brain development before birth. What we are learning is that prenatal stress can affect a woman's health during pregnancy in two ways, which in turn can influence her child's development. First, prenatal stress can affect behaviors that are important to maintaining good health during pregnancy (e.g., getting enough sleep, eating right,



Midwife Ann Forster Page, a collaborator of the WISHES research project, examines a patient at the Women's Health Specialists Clinic.

Prenatal Stress N.U.T.S. Ingredients

Novel
Unpredictable
Threat to
survival or
sense of self
Sense of lack of
control

Is my baby developing in the right way?
Work obligations are piling up.
I can't pay all my bills.
Will my birth plan be respected?
How will things change with my partner once we become parents?
I have to change my child's first diaper alone.
I want to get back to work but relatives think it is too early for me to return.

exercising, and getting good prenatal care). Second, prenatal stress can affect a woman's biological functioning during pregnancy, including her hormones, blood pressure, and immune system. The placenta, which regulates the prenatal environment, likely plays a major role here.

What's involved in the WISHES study?

So far, we have very strong evidence from animal research that supports the hypothesis that prenatal stress influences offspring brain development before birth. To study this question in humans, the WISHES study is following women and their children from early in pregnancy through the first two years of life. Women enroll in the study between 8-12 weeks of pregnancy, and complete questionnaires on stress, emotions, and health behaviors 5 times during pregnancy. At 4 time points during pregnancy, women also complete fetal monitoring sessions, which involve placing electrodes on the woman's belly to measure her baby's resting heart rate. We look at fetal heart rate because it is a "downstream" marker of fetal brain maturation; as central nervous system development unfolds during pregnancy the brain increasingly controls the heart, and in turn resting heart rate patterns show expected patterns of organization and change. Therefore, by measuring changes in resting fetal heart rate during pregnancy we are able to understand how prenatal experiences may play a role in setting up different trajectories of brain development. At 3 time points during pregnancy, women also provide a small hair sample, which allows us to measure cortisol production during pregnancy. Cortisol is a hormone that helps our body cope and respond in challenging situations. During pregnancy, cortisol also helps mature fetal tissues, such as the lungs, and may impact the development of the central nervous system and brain. Finally, at 1 time point women complete a short computer game while we track their eye-movements, in order to understand how differences in attentional styles may play a role in whether or how women experience stress during pregnancy.

Join us for the WISHES study



Every day we are learning more about how experiences during pregnancy may play a role in a child's growth and development. However, we have much more to learn. This WISHES study will be the first to connect the dots between prenatal experiences, brain development across pregnancy, and brain and behavioral development during the first two years of life. This will allow us to significantly advance our understanding of how prenatal experiences may play a role in setting up different trajectories of brain and behavioral development.

Women and families will be compensated up to \$560 for participating and will receive a small gift featuring pictures of their child's brain. For many of the prenatal visits we are able to meet with women at their homes. For all visits held at the U of M, we provide free parking and child care for older siblings. For more information on the study please email us at doyle291@umn.edu.

Following delivery, at 3, 6, 9, 12, and 24 months, children complete behavioral assessments and MRI brain scans, and parents complete questionnaires on their own experiences and their child's development. We use MRI for this study because unlike other imaging methods it does not involve any radiation, making it completely safe for use with infants. Also, all scans are conducted in the evenings during children's natural sleep, without the use of any sedation. Finally, a staff member is in the scanner with the child throughout the scan, so the scan can be discontinued immediately when children wake up.

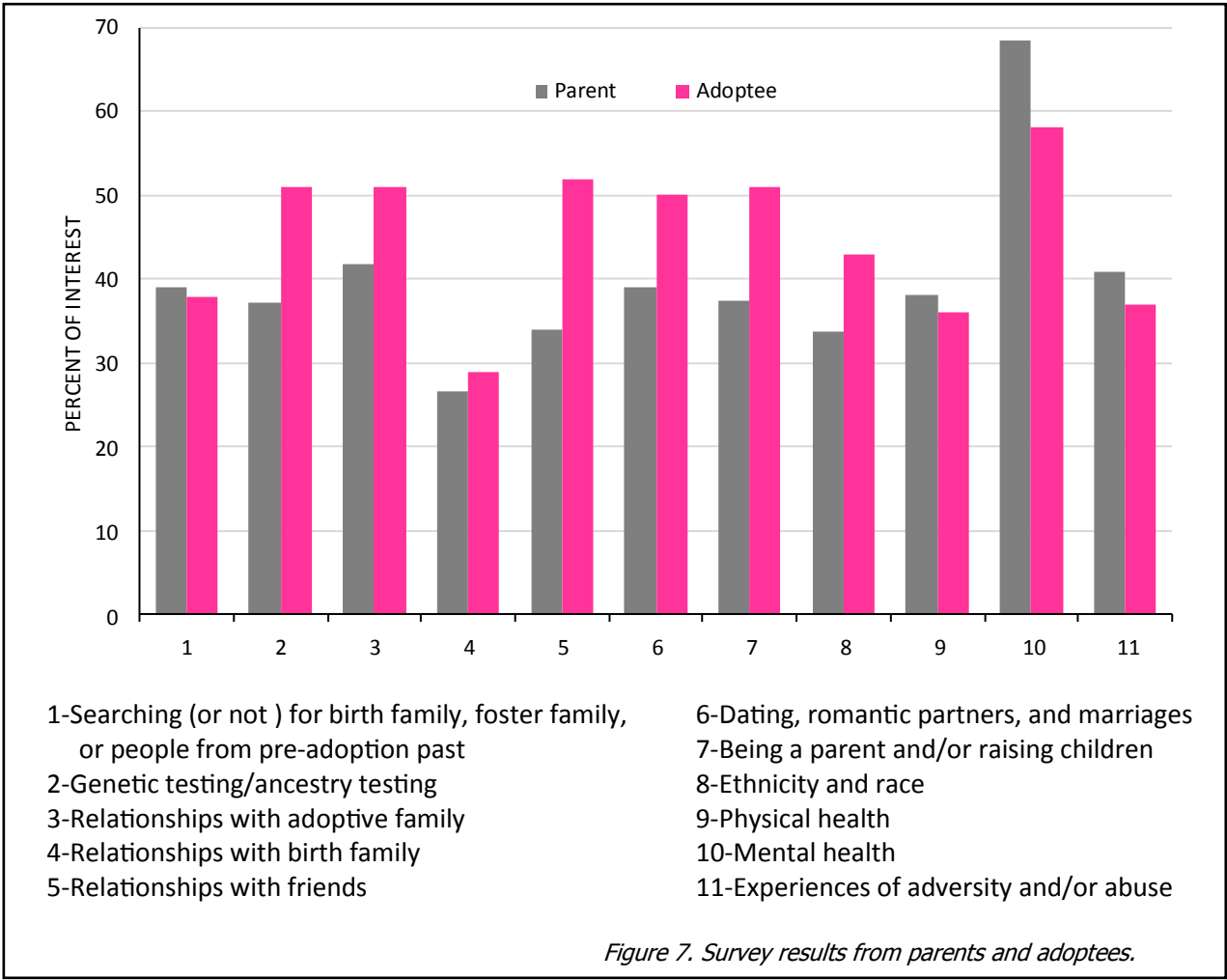
Survey to Guide Adoption Research

By: Samantha Lee and Bao Moua

Over the past year, the International Adoption Project Registry has been working to expand its research to include not just children and adolescents, but also adults who were adopted in childhood. Through two similar surveys we have been seeking input from adults who were adopted as children and their adoptive parents. The goal of the surveys was to find out what is important and what kind of topics were of interest to individuals and their families who have experienced international adoption.

To date we have received about 260 responses from the parents and about 100 responses from the adult adoptees. While we continue to welcome more responses on both surveys, what we are seeing so far from the Parent Survey is that 69% reported they are very much interested in learning more about the mental health of adults who were

internationally adopted as children (or the implications of international adoption on mental health). Other popular topics amongst parents were relationships with the adoptive family (42% very much interested), experiences of adversity or abuse (40% very much interested), dating, romantic partners and marriages and searching (or not) for birth family, foster family or people from pre-adoption past (both 39% very much interested). Parents had an opportunity to write down what other topics were of interest to them. Recurring topics included experiences of transitioning from teens into adulthood, post-adoption services, counseling and mental health services for adult adoptees and their families, discussion about prejudice and race in a multi-racial family, and adult adoptee's experiences of self-identity.



Mental health was also a high interest topic among the adult adoptees (57%). Other popular topics included relationships with friends (52% very much interested), relationships with adoptive family and being a parent and/or raising children (both 50% very much interested), and genetic testing and/or ancestry testing (49% very much interested). Participants also had a chance to write in other topic of interests to them. Recurring topics includes adoption among adoptees, self-identity development, integration of birth and adoptive cultures, and experiences of racism when you don't look like your adoptive parents. Figure 7 shows the different topics parents and adoptees rated their interest on.

We are hoping to use the survey responses to guide us in conducting more extensive research on areas of interest and to also identify a pool of possible research participants. Many of the participants who took the Adult Adoptee Survey volunteered to join the IAP's Adult Registry. In joining the IAP Adult Registry, members are allowing us to contact them in the future as research opportunities arise to provide knowledge of their experiences of international adoption.

To learn more about the IAP Adult Registry or register, visit our website at <http://z.umn.edu/IAPResearch>



International Adoption Project
Parent Registry & Adult Registry

 <http://z.umn.edu/IAPResearch>

 IAP@umn.edu

 612-626-8949

 [IAPumn](https://www.facebook.com/IAPumn)

We are still looking for more participants to take the survey. All participants will be entered into a random drawing for a \$50 electronic gift certificate.

Parents can take the survey at: <http://z.umn.edu/1bsp>

Adoptees who are 18 years or older can take the survey at: <http://z.umn.edu/1bsq>

Understanding the Diaspora Experiences of Internationally Adopted Youth

By Adam Kim, Xiang Zhou and Richard Lee

Scholars often refer to international adoption as the “quiet migration” because it is not viewed alongside more visible patterns of migration, such as voluntary immigrants, refugees, and international exchanges. But a common experience across all these forms of migration is the physical and psychological sense of displacement from one’s homeland – otherwise known as diaspora. The dispersion of the Jewish people around the world is a classic example of a diaspora, and more recent diasporas include Hmong and Somali refugees – many of whom now call Minnesota home. In our community outreach and qualitative studies with adopted youth and young adults, this diaspora feeling of displacement and loss is commonly described among international adoptees as well.

We therefore set out to understand the diaspora experiences of internationally adopted individuals and other international migrants. We worked to create a way to understand the impact of this displacement on an individual’s identity, culminating in the development of the Diaspora Identity Scale. In our working model, diaspora identity consists of two distinct features – homeland yearning and co-ethnic solidarity. In the case of our work with adopted Koreans, homeland yearning refers to a real and imagined wish to return to Korea and psychologically feeling more complete living or traveling to the homeland. Co-ethnic solidarity refers to a belief that Koreans around the world should work together as compatriots.

In 2014, we surveyed over one hundred adoptive families – parents and adolescent children – using this newly constructed scale. We found initial support for these two features of diaspora: homeland yearning and co-ethnic solidarity. We also found diaspora identity is related to but distinct from ethnic-racial identity (i.e., a sense of identity that is built around membership to an ethnic-racial group), adoptive identity (i.e., a sense of identity that is built around being adopted) and thoughts about birth family (i.e., wondering whether you are similar to your birth parents). We have also surveyed other Korean populations, such as Korean immigrants in New Zealand and Korean international students in the United States and found similar support for diaspora identity. These findings are currently being written up for publication.

We are continuing to develop both our measure of diaspora identity and our understanding of the role of displacement on the identity development of internationally adopted youth. It is only with help from the International Adoption Project and families like you, that we were able to pursue this project, so we greatly appreciate your contribution to our research and that of the many other researchers involved.



Does Emotion Regulation Moderate the Discrimination-Adjustment Link for Adopted Korean American Adolescents?

By Yekun Qin, Adam Kim, Jenny Su, Alison Hu, and Richard Lee

Growing up in a White family does not necessarily protect internationally adopted Korean Americans from the harmful effects of racial/ethnic discrimination on adjustment. Previous studies have found that experiences of discrimination are related to worse adjustment among transracial adoptees. To cope with these negative effects, transracial Korean adoptees may use different combinations of emotion regulation strategies, such as cognitive reappraisal (i.e., reframing the discrimination situation in a less negative way) and emotional suppression (i.e., inhibiting on-going emotion expression). However, there is limited research on how transracially adopted Korean American adolescents' emotion regulations may moderate the link between discrimination and adjustment.

To address this gap in the literature, we surveyed 120 parents of Korean adopted children (ages 5-12) in 2007 and followed up with these parents and their now adolescent aged children (ages 13-19) again in 2014. As part of the survey, parents reported the behavioral adjustment of the children in 2007 and 2014. Adolescents also reported their typical emotion regulation strategies and their experiences with discrimination in the 2014 survey. We first identified different emotional regulation strategies profiles employed by the adolescents. We then examined the discrimination-adjustment link (using 2014 adolescent reports) controlling for their childhood behavioral adjustment scores from 2007. Finally, we examined whether different combinations of emotion regulation strategies changed (e.g., increased, decreased) the effect of discrimination on adjustment.

As illustrated in Figure 8, Korean adoptees displayed three distinct emotion regulation profiles. A relatively high score on reappraisal and a very low score on suppression characterized the High Reappraisal/Low Suppression

(HR/LS) group. A relatively high score on reappraisal and a moderate score on suppression characterized the High Reappraisal/Moderate Suppression (HR/MS) group. A moderate score on both reappraisal and suppression with the suppression score being higher than the reappraisal score characterized the Moderate Reappraisal/Moderate Suppression (MR/MS) group. After taking into account the behavioral adjustment of the adoptees in childhood, discrimination was still related to poor adjustment in adolescence. Finally, the three different emotion regulation profiles did not change the impact of discrimination on adjustment. However, adopted Korean adolescents with the HR/LS profile reported the best adjustment in general.

Overall, these findings provide further support for the strong negative effects of discrimination to adolescent adjustment. Although the emotion regulation profiles did not change the pernicious effects of discrimination, adoptees who are able to re-appraise stressful situations and not suppress their emotions showed the best behavioral adjustment.

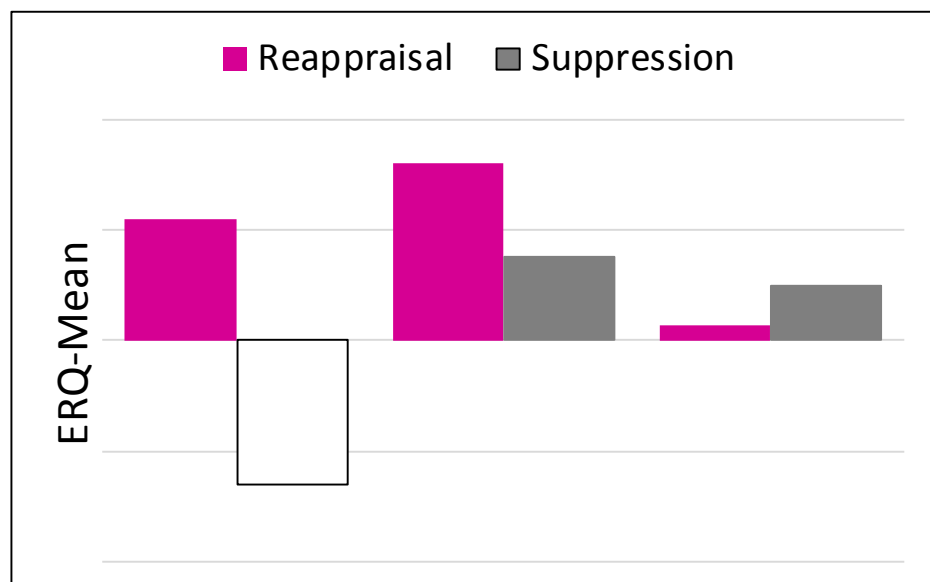


Figure 8. Adopted Korean American adolescents' emotion regulation profiles.

Toddlers and Parents & Toddler Attention Studies



By Shanna Mliner

We are honored to be part of the JPB Research Network on Toxic Stress and Health. This is a pioneering national network of developmental scientists, community leaders, and primary care practices that are working together to better understand how difficult life circumstances influence development and health, and develop best practices in early assessment and intervention to transform pediatric practice. The ultimate goal is the prevention of lifelong impairments in mental health and chronic disease due to over triggering of the body's stress responses early in life. Through this network, we are running two research projects at pediatric clinics within Children's Hospitals and Clinics of Minnesota: the Toddlers and Parents Study and the Toddler Attention Study. The purpose of these studies is to help develop measures that identify evidence of over triggering of stress systems to create a set of measures that doctors can collect during well-child visits to identify families who could use extra help in supporting the development of their children.

We all know that stress is a part of life. Learning how to cope with stress is an important part of a child's healthy development, whether it's the stress of meeting new

It's when situations of extreme stress are prolonged and unrelenting, in the absence of supportive adults, that a child is affected by toxic stress.

people for shy children or the second-hand stress of watching parents dealing with food insecurity, concerns about paying the rent or living in a dangerous neighborhood. There is a range of physiological responses to stress such as increased heart rate and fluctuations in cortisol stress hormone levels. When stress occurs to a young child within an environment of supportive relationships with adults, these physiological effects are buffered and brought back down to baseline. The result is a healthy stress response system. For larger stressors - such as the death or serious illness of a loved one, a frightening injury, the divorce of one's parents, or a natural disaster - these physiological responses are sustained for a longer period of time. But still, the buffering effects of supportive adult relationships allow the brain to recover from what might otherwise be damaging effects. It's when situations of extreme stress are prolonged and unrelenting, in the absence of supportive adults, that a child is affected by toxic stress. These situations can include extreme poverty, physical or emotional abuse, chronic neglect, severe maternal depression, substance abuse, or family violence. Without the support of a caring network of adults, stress can alter brain architecture and lead to stress management systems

that respond at relatively lower thresholds, thereby increasing the risk of stress-related physical and mental illness.

Previous research we conducted almost 20 years ago demonstrated the profound importance of what we call “parental social buffering”. That is, once the child has formed a secure attachment relationship with the parent when the parent is present, the child can experience things that are very distressing but the body is buffered from showing a cortisol stress hormone response. There is a powerful parental stress-protective mechanism. Importantly, children who are insecurely attached or where the attachment relationship is disordered do not have this same stress protection. Showing cortisol elevations even when the parent is present might be an important index of toxic stress vulnerability that we can include in our stress battery.

In the Toddlers and Parents Study, we followed 12 to 18 month-olds as they came in for their well-baby checkup with inoculations. We went with the parent and toddler throughout the visit, parents completed questionnaires, we took saliva samples in the waiting room, before shots were given, and 20 minutes after the shots. We had a highly trained observer watch how the child used the parent throughout the visit as a source of security. We recruited 190 families for this study and just recently completed data collection. We are waiting for the cortisol stress hormone analysis, but so far we’ve seen in the data that we do have a range of both life stressors and

attachment security. In families with low stress indicators, 80% of the toddlers were securely attached to the parent. In families with higher stress indicators, only about 50% of the children were securely attached. But this still means that 50% of those children in high stressed families were securely attached. Soon we will be able to analyze the saliva samples to determine cortisol response levels to test the buffering role of secure relationships.

We are also just beginning the second Toddler Attention Study to assess the development of attention skills of children 9 to 17 months old as they go through their well-baby exams in the clinic. Good attention skills rely on areas of the brain that are very sensitive to stress. We will be showing children simple videos and tracking their eye-movements to see how they are processing the information on the screen. The short videos test aspects of attention regulation. This is work being done in collaboration with two other colleagues, Philip Zelazo and Jed Elison. Our goal is to see whether delays in the early development of attention can be detected in 9- to 17-month old children while they visit the doctor for their regular check-ups. Detecting delays this early would allow plenty of opportunity to strengthen the brain circuits that help children control their attention and their behavior.

Questions about the Toddlers and Parent Study or the Toddler Attention Study can be directed to Shanna Mliner at newma039@umn.edu or 612-624-4351.



Participate in Research

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. With our continuation of the Immune 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.



This summer we continuing our Immune study, and now we have a special opportunity to add the study of the microbiome! If you are interested in learning more about the microbiome, check out this short YouTube video from NPR on how our immune cells and the microbiome inside of us work together to help us stay healthy: <https://tinyurl.com/k2hww4r>



Through scientific advancements and decreased costs in genetic testing, many internationally adopted individuals now have the opportunity to learn more about their health history and genetic ancestry through inexpensive direct-to-consumer genetic testing kits, such as 23andMe. However,

Genetic Testing Among Adult Adoptees

very little is known about people's attitude, interest, and knowledge about genetic testing within the adoption community, as well as what factors predict people's interests in genetic testing. We also do not know what kinds of information people are seeking or not seeking from genetic testing and how they would use such information. To address these gaps, we aim to identify reasons why internationally adopted individuals may choose to complete or refrain from genetic testing. We will also look at how the information given in direct-to-consumer genetic testing kits relates to experiences as adoptees.

We are seeking to recruit 60 internationally adopted individuals between the ages of 18 to 35 years

old. Study participants will complete a brief online survey that asks questions about their attitude, interest and knowledge about genetic testing, personal and social experiences, adoption specific experiences, and basic demographics. The survey will take no longer than 30 minutes to complete. Participants will receive a \$10 Amazon gift card at the completion of the study.

This research hopes to aid in the understanding of what influences internationally adopted individual's decision-making process when considering whether to have genetic testing done. If you are interested in participating in this study or would like more information, please email the Familee Lab at familee@umn.edu.

NEW RESEARCH OPPORTUNITY

Early Life Stress, Growth, and Metabolic Health Study

Ages 8 through 17 years needed

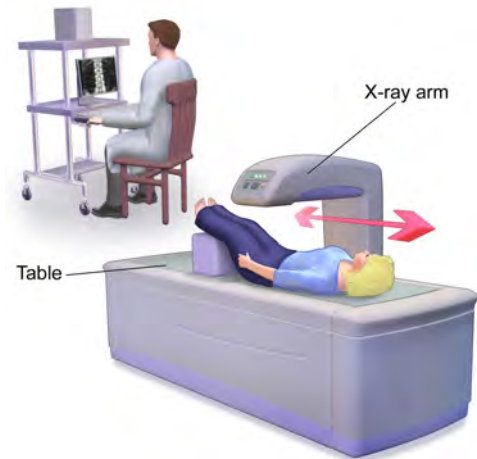
New research suggests that early life stress and early height stunting can contribute to later health by impacting the growth, body fat composition, and cardiovascular health. This may mean that experiences in childhood influence our health in adulthood. If we can identify these changes early on, then we can develop interventions to hopefully prevent later health problems.

In the Puberty Study, we did not find that children who were growth-stunted at adoption were becoming overweight as they approached adolescence, so the question for heart health is actually where does the body put its fat. Deep visceral (belly) fat is a risk factor for Type II diabetes and heart disease. You can be normal weight and yet still be at risk by packing fat in deep belly areas.

To be sure that children who were short for their age at adoption and then grew quickly are also heart and body composition healthy, we will be conducting a study using cutting-edge measures of body fat composition and cardiovascular health measures. Personalized results will be given to the parents of each participant and these can be taken to their pediatrician if desired.

For this study we are looking for children and teenagers (ages 8 through 17 years) who were adopted internationally from orphanages or similar institutions.

In addition to personalized results, participants will be compensated for 1 visit to the University of Minnesota to have a full-body DXA scan of body composition, their cardiovascular health assessed, have blood drawn, and answer questionnaires.



Dr. Judy Eckerle featured in Minnesota Monthly

Dr. Judy Eckerle, head of the University of Minnesota Adoption Medicine Clinic, was recently featured in Minnesota Monthly's "The State of Adoption". Dr. Eckerle shares her story as a Korean adoptee and how she's extending her work beyond international adoption.

For the full article visit:

<http://www.minnesotamonthly.com/Lifestyle/The-State-of-Adoption/>

GUNNAR LAB

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

Return Service Requested

Gunnar Lab and Staff

INVESTIGATORS

Megan Gunnar, *Regents Professor*
Richard Lee, *Professor*
Brad Miller, *Pediatric Endocrinologist*

STAFF

Jennifer Armerding, *Clinical Interviewer*
Carrie DePasquale, *Graduate Student*
Christopher Desjardins, *Research Associate*
Bonny Donzella, *Senior Research Fellow*
Colleen Doyle, *Graduate Student*
Jan Goodwalt, *Registered Nurse*
Terri Jones, *Registered Nurse*
Shreya Lakhan-Pal, *Graduate Student*
Keira Leneman, *Graduate Student*
Alyssa Miller, *Senior Lab Tech*
Shanna Mliner, *Senior Research Fellow*
Bao Moua, *Principle Lab Tech*
Anna Parenteau, *Undergraduate Student*
Nicole Perry, *Post-doctoral Student*
Lea Neumann, *Senior Lab Tech*
Brie Reid, *Graduate Student*
Melissa Stoll, *Registered Nurse*
Heather Taylor, *Senior Lab Tech*

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
Familee Lab
Institute of Child Development
University of Minnesota Health Adoption
Medicine Clinic

DESIGNER

Samantha Lee, Undergraduate Student
Research Outreach Intern

Icon Credit: The Noun Project
Photo Credit: unsplash.com

ONLINE EDITION

www.cehd.umn.edu/icd/research/gunnarlab

This newsletter is published annually by the Gunnar Lab at the University of Minnesota's 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 IAP@umn.edu or 612-626-8949.

