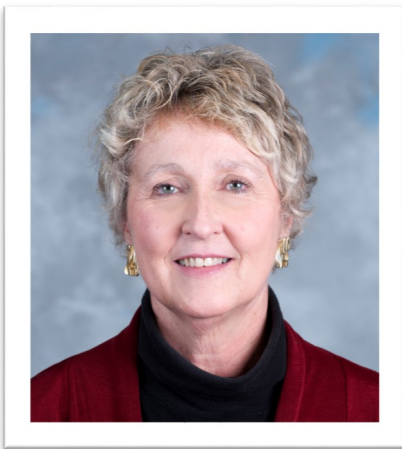




Fall 2023 : NEWS FROM  
**The Gunnar Lab**

**for Developmental Psychobiology Research**



**Greetings  
 from  
 Professor  
 Megan  
 Gunnar:**

The Gunnar Lab studies how children and adolescents regulate stress. The physiology of stress includes many systems, but the two most accessible to those of us studying children are the systems that produce the hormone cortisol, and the autonomic nervous system that regulates the heart. A third system, the immune system (in particular inflammation), also plays a critical role in stress, but this requires a blood sample, which we hesitate to ask from pre-adolescent children.

We are interested in the physiology of stress because stress-responsive systems are powerful and play significant roles in the

development of physical and emotional problems. They are also an important pathway that helps us understand how the experiences of childhood “get under the skin” to affect our life-long health.

In this newsletter we will describe some of the ongoing work of our research group, from studies of whether a short loving kindness meditation helps parents deal with the challenges posed by toddlers, to studies of role of social partners in helping adolescents cope with threats to their “social selves”, to studies of the cardiometabolic health of adolescents and young adults who experienced being in orphanages or other institutions early in life before being adopted into well-resourced, supportive and loving families.

As I do every year, I want to deeply thank all the families who have helped us with our research. We are incredibly grateful to you and your children, and hope that your research experiences have been fun and interesting.



Photo by Jacob Lund from Noun Project

# Loving-Kindness Meditations for Parents of Toddlers

By: Emmy Reilly

**T**oddlerhood can be a stressful time for parents, but is also a time when the relationship between parent and child moves into what attachment researchers call a “goal corrected partnership”. That is, in secure relationships, children (at least some of the time) want to partner with the parent to achieve mutual goals. These times, of course, contrast with the “no” times which give rise to the idea of the “terrible two’s”. The back and forth between the toddler wanting to please and work together with the parent and the toddler wanting to be independent and get their own way is part of what makes parenting of toddlers both so challenging and so rewarding. It is also a great time to provide more support for parents!

Warm, responsive parenting helps to set children up for better cognitive and emotional development and physical health, and this type of parenting requires compassion for your child *and* the parent’s regulation of their own stress reactions. Compassion can be induced using loving-kindness meditations (LKMs), a type of meditation that involves sending feelings of kindness to oneself, loved ones, and all beings. LKMs promote a relaxed physiological state, which is helpful for sensitive, responsive parenting. However, no one has yet tested whether LKMs reduce stress physiology

in parents or support sensitive parenting behaviors. Therefore, for this study, which was my (Emmy Reilly’s) dissertation, that is exactly what we set out to do! We did a mini trial testing the immediate effects of a LKM on stress physiology and parenting behaviors in parents of toddlers.

## Who participated?

141 parents of toddlers (18-36 months) completed an online survey and participated in a video call between March and December 2022.

## What we did

Parents completed an online survey including questions about their household, COVID-19 impacts on their lives, self-compassion and compassion for others, parenting stress, and mindfulness practices. Within 2 weeks of completing their survey, parents participated in a 1-hour video call on Zoom. Parents were randomly assigned to listen to either a LKM, a focused imagery audio, or a podcast about toddler play during the video call for 15 minutes. The focused imagery audio served as an active control condition since it was somewhat relaxing and involved guided imagery. The podcast served as a non-meditative control condition. Then, parents completed a brief survey about their state

self-compassion and then engaged in a play-based interaction with their toddler. We had parents play with their child with some toys, then clean up the toys, and then work with their child to make a face out of playdough. Finally, we had parents talk about their child for a few minutes while their child was outside of the room. Throughout the video call, parents also provided 5 small saliva samples to measure their stress physiology before and after listening to the LKM or control audio and before and after interacting with their child.

## FINDINGS

Parents who listened to the LKM reported that the LKM made them feel more compassionate. Parents who listened to the LKM slowly decreased their stress (measured in saliva samples) across the video call compared to parents who listened to the podcast or focused imagery. Overall, parents in our study were

highly sensitive to their children. Perhaps for this reason, we did not find that listening to the LKM increased sensitivity. Our results have led us to think of ways of trying LKM's in groups of parents who are more highly stressed than those in our study are, and who may not already be so highly sensitive to their children's signals.

## Conclusion

Supporting compassion and self-compassion in parents of toddlers may be helpful both for the parents' wellbeing and their child's development! LKMs are one possible tool for promoting compassion and self-compassion, although individuals should take care when listening to these meditations as negative emotions can sometimes come up. However, giving yourself kindness and caring during challenging times is a great way to practice self-compassion and could benefit your child too!

# Childhood Trauma and Self-Compassion

*By: Grace Divine Boutouli, Emmy Reilly, & Megan Gunnar*

In addition to Emmy's dissertation goals in the Loving-Kindness Meditation research study, one of Emmy's undergraduate research assistant, Grace Boutouli, wanted to see if the meditation might be especially effective for parents who had experienced trauma during their childhood. Grace asked parents in Emmy's dissertation study to also complete the Childhood Trauma Questionnaire. This questionnaire asked about potentially traumatic events prior to age 18 years, such as death of a parent, parental divorce or separation, being seriously ill or having a serious accident, experiencing abuse, witnessing violence, and so on. Most of the parents in the study had experienced few such events in their childhood, but some had experienced more. Grace did not find that this influenced the extent to which the loving-kindness meditation affected parenting. What she did find was that parents who reported more traumatic

experiences in childhood also scored lower on self-compassion. Grace had the opportunity to travel to the Netherlands to present the poster of her study at the International Society for Developmental Psychobiology.



Institute of Child Development students attended the International Society for Developmental Psychobiology annual conference where they presented their research work. Students pictured here are enjoying dinner in downtown Utrecht with Professors Gunnar & Koss. (Left to right: Grace-Divine Boutouli, Dr. Kalsea Koss (University of Georgia, former post doctoral fellow in the Gunnar Lab), Maya Bowen, Finola Kane-Grade, Dr. Megan Gunnar (University of MN), Lydia Lewis, and Tralucia Powell).

# Preschool Return Study Results

*By Maya Bowen & Megan Gunnar*

When the Covid-19 pandemic hit the United States in the spring of 2020, stringent social distancing policies were put into place, and many schools were closed or instituted limited enrollment to reduce the risk of transmission. Many preschool-aged children, who would normally be entering preschool and interacting with groups of peers for the first time, were instead spending an increased amount of time at home with limited exposure to children outside their family. Throughout the 2020-2021 pandemic academic year, there was variation in the amount of peer and other adult exposure children experienced, as some children were able to return to preschool and childcare, some stayed home, and others were able to spend time

outside in neighborhood play groups.

In the fall of 2021, the Child Development Laboratory School (CDLS) half-day program at the University of Minnesota reopened to full capacity. [They had operated at half capacity and only outdoors during the 2020-2021 academic year.] We collaborated with the lab school to study how the variation in social experience during the pandemic might influence children's adjustment when returning to or starting preschool.

The CDLS half-day program had a total of 74 children between the ages of 2-5 years old enrolled (69% male). We set up five GoPro 360 cameras on the three CDLS playgrounds. With these cameras, we were able to film 2 hours of each class's free play sessions on the 1<sup>st</sup> and 11<sup>th</sup> day of

class. The videos were coded by a team of trained undergraduate research assistants who observed children's moods, behaviors, and interactions. From these observations, we calculated an adjustment score which reflected how much of the time the child was busily engaged in play during free play and how interactive and coordinated their play was with peers.

Parents reported a lot of variation in peer contact during the pandemic. Some of the children had been in the CDLS half day program (previously known as the Shirley Moore Preschool) during the 2020-2021 school year, some had been in other types of childcare, some played with kids in their neighborhood, and some had very little contact with children outside their own families.

We noted how much peer contact children had and examined contact with infants (most had none), peers (children within a year or so of their age), and school-aged children. Contact with people outside the family increased in the spring of 2021 and into the summer of 2021 (when children could play together outside), but at the beginning of the 2021 school-year some children were interacting with other peers for the first time in a year, and others were renewing their experiences in the preschool after summer break. This gave us a great opportunity to correlate experiences during 2020-2021 with adjustment to school in September of 2021.

The take home message from this research is that peer experience was more important for preschool adjustment than interaction with school-aged children or adults. By the end of our observation period (the children's 11<sup>th</sup> day of class), children with more peer experience in the last year were more engaged and more integrated with other children. We had teachers rate how adjusted the children were which supported

the same finding we found. Peer experience mattered over and above whether that experience was in the CDLS or not. It also mattered more than the children's temperament. We thought that shy children might be more negatively affected by not having social experiences during the pandemic, but that was not the case. Shyness was related to adjustment (according to teacher ratings), but even outgoing children struggled to adjust in those first weeks if they had little to no experience with kids their own age during the pandemic year.

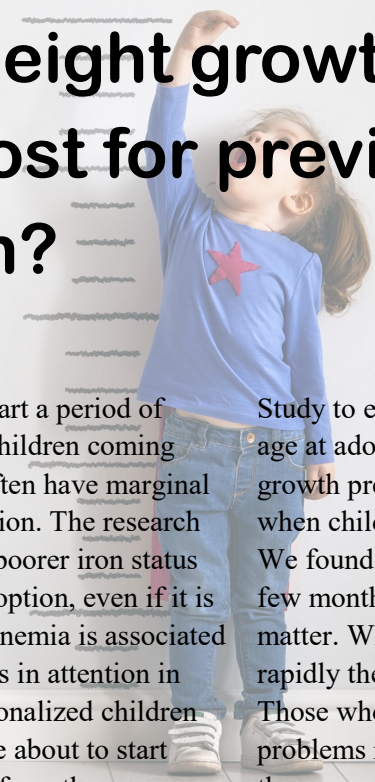
We only observed the first few weeks of class. We do not know if children "caught up" to adjusting to preschool or whether we will see signs of the pandemic in the behavior of children who were preschool-aged during the pandemic. We can be confident that high quality peer group experiences, such as those provided by the CDLS, may be a great antidote to missing out on peer experiences for a year during the formative preschool years.



Photo by Jacob Lund from Noun Project

# Does rapid rebound height growth come at a neurocognitive cost for previously institutionalized youth?

By: Danruo Zhong, Brie Reid, & Megan Gunnar



One of the most high energy things we do in life is to grow. To grow taller, our body must make new bones, muscles, tissues, and blood. When we grow rapidly, our bodies must assign lots of metabolic resources to the process of simply growing. Putting lots of resources into growing means that they might not be available for other bodily functions. One of those resources is iron. Iron is critically important for many bodily functions, including supporting brain health and development. Back to iron in a moment.

One way that children survive difficult situations is to grow more slowly if at all. Children who have started out their lives in institutional care are often shorter, but not thinner, than other children their age when they arrive in their families in the United States. They then begin to grow more rapidly than other children. This is called, “catch up” growth. We have been interested in catch-up growth for a long time. While, on the one hand, it seems terrific that the kids are growing rapidly, on the other hand doing so places demands on their bodies. Several years ago, our colleagues in the medical school at the University of Minnesota found that children who showed more rapid catch-up growth sometimes outstripped their iron stores and began to be a bit iron deficient. This probably doesn’t happen to children with adequate iron

stores when they start a period of rapid growth, but children coming from institutions often have marginal iron stores at adoption. The research study showed that poorer iron status within a year of adoption, even if it is not at the level of anemia is associated with more problems in attention in previously institutionalized children by the time they are about to start school. Figure 1 is from the paper we published in 2014.<sup>1</sup>

In that study, though, we could not trace the effects to rapid catch-up growth as we did not measure them over time. Recently, we used data from our Transition into the Family

Study to examine whether height for age at adoption or rate of catch-up growth predicted attention problems when children were entering school. We found that height for age within a few months of adoption did not matter. What did matter was how rapidly they grew after adoption. Those who grew faster had more problems regulating attention when they were entering school. The results of these studies raise challenging issues for parents and medical practitioners. Should we try to slow down post-adoption growth or are their ways to making sure that we help the body have enough resources to rapidly grow both bodies and brains?

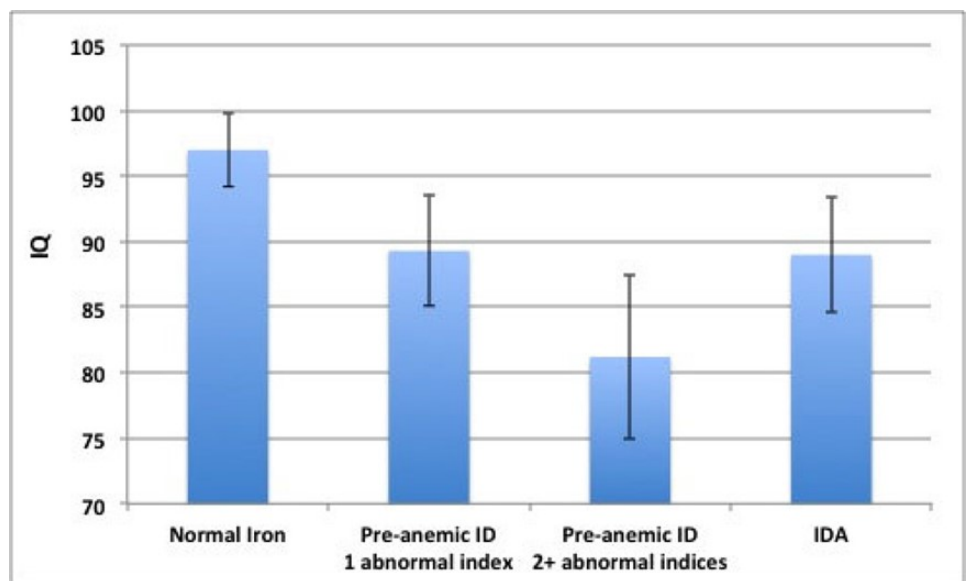


Figure 1. The effect of ID (iron deficiency) on IQ scores (standard scoring: M = 100, SD = 15). Means and standard errors for children in the normal iron, pre-anemic ID with 1 abnormal index, pre-anemic ID with 2+ abnormal indices, and IDA (ID anemia) groups are displayed.<sup>1</sup>

<sup>1</sup>Doom JR, Gunnar MR, Georgieff MK, Kroupina MG, Frenn K, Fuglestad AJ, Carlson SM. Beyond stimulus deprivation: iron deficiency and cognitive deficits in postinstitutionalized children. *Child Dev.* 2014 Sep-Oct;85(5):1805-12. doi: 10.1111/cdev.12231. Epub 2014 Mar 5. PMID: 24597672; PMCID: PMC4156571.

# Cardiovascular Health Study

By: Danruo Zhong, Bonny Donzella, & Megan Gunnar

Recently, the American Heart Association concluded that adult cardiometabolic disease can be traced, in some instances, to early life stress (ELS) conditions. They also noted the need to determine sensitive periods during which exposure to adversity alters systems contributing to cardiometabolic risk and thus when interventions will be the most effective.

These are the goals of the CardioHealth Study. By comparing youth adopted into well-resourced families from conditions of relative deprivation and adversity early in life to youth who were born into and raised in similarly well-resourced families, we are examining the question of whether very early experiences present an increase in risk for poor heart health that we can detect as early as adolescence. Thus, for two years, with the help of families like yours, we enrolled more than 190 youth aged 12-22 into our study, with about half of the sample made up of youth who were adopted

internationally from orphanage-like care (hereafter, PI for previously institutionalized) and half were non-adopted (NA) having been born into their families in Minnesota. The first wave of data collection was completed in February 2023, the assays have been run, and we are now beginning to analyze those data.

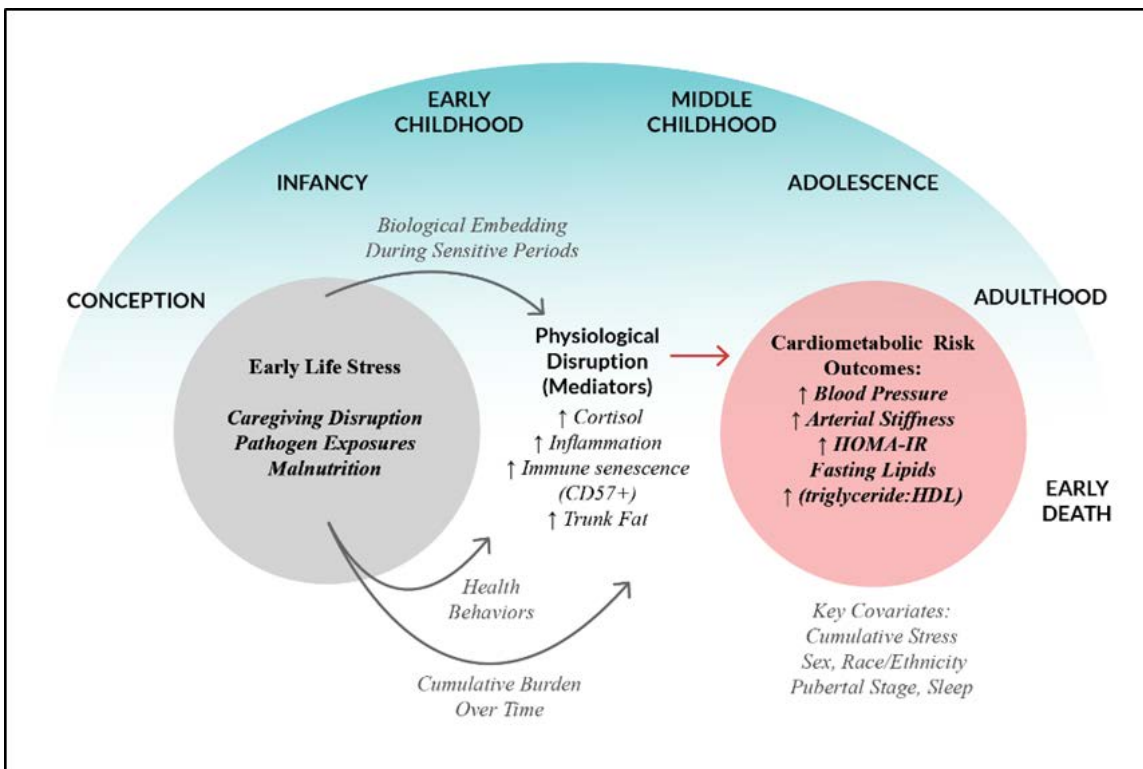
Generally speaking, both PI and NA youth are more fit than the average youth in the US. This is not surprising as cardiometabolic health is correlated with social class and both PI and NA youth have typically lived in relatively well-educated and higher income families the majority of their lives. One example is body mass index (BMI). The 85th percentile is the cutoff for overweight, and the 95th for obese. The Center for Disease Control estimates that 22% of the adolescent population in the US suffers from obesity. In our sample, the percentage was about half that or 12%. Among the NA youth, we had even fewer, 8%, in the

obese range, while we did see some evidence of increased risk for PI youth (16%, with the risk carried by the male PI youth, 27%).

## Allostatic Load

One way of examining the impact of early life adversity is to calculate something called “allostatic load.” Allostasis is the idea that when we are threatened (psychologically or physically) we mount

*Cardio Health, to page 8*



*CardioHealth, from page 7*



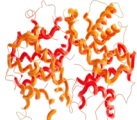

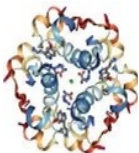





stress responses that include elevated cortisol, adrenaline, and immune (inflammation) responses. Allostasis means achieving stability through change and the idea is that by mounting these stress responses we are stabilizing ourselves and allowing ourselves to cope with the immediate threat. This is good. But there is a cost. When we mount these responses relatively infrequently, the costs are minimal. But when we need to do this a lot, costs are greater, and we begin to see alterations in systems impacted

by stress. Allostatic load is a summing up of the systems that show the impact of chronic stress activation.

In orphanages or orphanage-like institutions, children receive little individual care. They are often exposed to viruses and other pathogens, and they fall behind in physical and behavioral milestones. Once they are adopted, they often show remarkable rebounds. Yet, those few orphanage years may result in evidence of greater allostatic load years later. Thus, as a first pass through our data, we used

the first assessments for each participant to calculate a measure of allostatic load. **The cardiometabolic system is a major target of stress and thus measures of cardiometabolic health are typically used to calculate Allostatic Load.**

We used the following measures, listed below, to calculate allostatic load. [Note that if any measure was in a clinical range, we have already contacted the family. The means of these measures are in “normal” range, even when one group has a higher mean level than

 <p><b>Hair cortisol:</b> Cortisol is a necessary hormone even when we are not stressed. Cortisol increases with stress and both stress and basal cortisol levels accumulate in hair. We took hair samples that gave us a calendar of cortisol produced in the last 3 months.</p>	 <p><b>C-Reactive Protein:</b> This can be considered a cumulative measure of inflammation.</p>	 <p><b>TNF-alpha.</b> A cytokine in the immune system that is important in inflammation.</p>
 <p><b>IL-6:</b> This is a cytokine that works in the immune system to trigger an immune response. It is also an index of inflammatory activity.</p>	 <p><b>Insulin:</b> Insulin moves sugars out of the blood system and into storage.</p>	 <p><b>HDL and LDL cholesterol:</b> (“good vs bad” cholesterol).</p>
 <p><b>Waist-hip ratio and Body Mass Index:</b> Higher waist-hip ratio is a risk for cardiometabolic disease and higher body mass (weight for height) is also a risk factor.</p>	 <p><b>Plasma Glucose levels:</b> The level of sugar present in blood.</p>	 <p><b>Triglycerides:</b> The most common lipid in circulation.</p>
 <p><b>Systolic and Diastolic Blood Pressure:</b> The pressure of blood in the circulatory system.</p>	<p>Measures we collected to calculate allostatic load.</p>	



the other.]

To calculate allostatic load, we gave participants a score of 1 for every one of their measures that was in the top 25% in whatever range (high or low) is evidence of chronic stress activation.

**What did we learn when we combined all the measures and summed the number of scores for each participant?**

1) Males tended to have higher allostatic load (AL) scores than females (here we used sex assigned at birth), 2) with age, allostatic load scores increased (our participants ranged from 12-22 years), 3) higher current life stress calculated from an online self-report was associated with higher AL scores. **But independent of all these effects, PI youth had higher AL scores than NA youth.** The difference was an average of 3.6 for the PI youth and 2.7 for the NA youth. Keep in mind that the score was out of 12, so both groups are still carrying a relatively light load.

**Conclusions:** We have a lot of data yet to analyze from the first assessment. We are now seeing the youth for a second assessment to see if changes in AL and in other measures of cardiometabolic risk change more rapidly during the adolescent or young adult years for one group or the other. We also expect that the extent to which the PI youth were delayed in their physical growth at the time of adoption may be a critical measure in identifying those youth with higher risk. We are contacting families where we are missing this information to be sure we have information on this from all PI participants.

**The bottom line for participants:** Some of our participants, especially those with early histories of institutional care, will need to be vigilant about diet, exercise and tracking their heart health as they age.

**The bottom line for policy makers:** a) Orphanages are not the best places to raise babies. Dr. Gunnar along with other researchers who study the effects of institutions around the world are advocating for finding more family-like ways of dealing with the many children worldwide who are without permanent parents. b) As we think about how early we need to



intervene to support families and children in the U.S. as well as worldwide, we need to think very early. In the womb and the first few years are critical years that have effects on life-long health. Dr. Gunnar is working with researchers throughout the US and in Minnesota to advocate for family-friendly policies. For many years she has been on the advisory committee to the Governor of Minnesota's Children's Cabinet and she was a founding member of the National Scientific Council on the Developing Child that works to translate research on child development for the use of policy makers and practitioners.

Stay tuned! The second wave of collection is underway! We are reaching out to families to schedule their follow-up visits. If you have already participated, watch for an email from [cariodhealth@umn.edu](mailto:cariodhealth@umn.edu) or a text from our study phone (612) 492-1253. We will contact you a month or two before the second anniversary of your participation.

# Public Investments in Children are the Least when Families are Earning the Least and Children’s Brains are Growing the Most Rapidly

By: Megan Gunnar

Professor Gunnar and several of her students have been active members of the RAPID-EC study (Rapid Assessment of Pandemic Impact on Development – Early Childhood). This study, led by Professor Phil Fisher at Stanford University, began with the onset of the pandemic in April 2020. Its goal was to survey parents of young children regularly and rapidly turn that information around so that the information could affect policies to buffer families with young children from the economic and emotional impact of the pandemic.

The project is still ongoing as we examine how policies during the pandemic and current policies impact families with young children. Two recent reports are of interest. One shows that for the thousands of parents in the survey who live in all states of the country, policies that provided housing and other support during the pandemic reduced housing and food insecurity. As one parent put it, “The CTC (child tax credit) gave us peace of mind that there would be enough money to pay our bills.” (Parent in Virginia, Dec 2021). And another, “My husband has been laid off for most of the pandemic. The stimulus checks help us catch up on bills that were behind and pay for food and rent and

basic needs.” (Parent in West Virginia, April 2021). And yet another, “What’s helping me and my family the most is the school district providing free snack and lunch for my 8-year-old, so I’ve been able to share those items with my 3-year-old.” (Parent in New Jersey, July 2020.)

The pandemic hit many families with young children hard, in part,

because when children are young, it is when their parents are also at the beginning of their earning power. Simply put, parents with young children are challenged with both managing the intense demands of infants, toddlers and preschoolers and paying for all their needs at a time when they are typically earning less than they will once their children are older. Then came the pandemic, job loss, and other challenges. But now

## LOWEST RATE OF FOOD HARDSHIP COINCIDES WITH NUMEROUS FEDERAL PROGRAMS AND POLICIES

Overall rate of food hardship, April 2020–April 2023\*

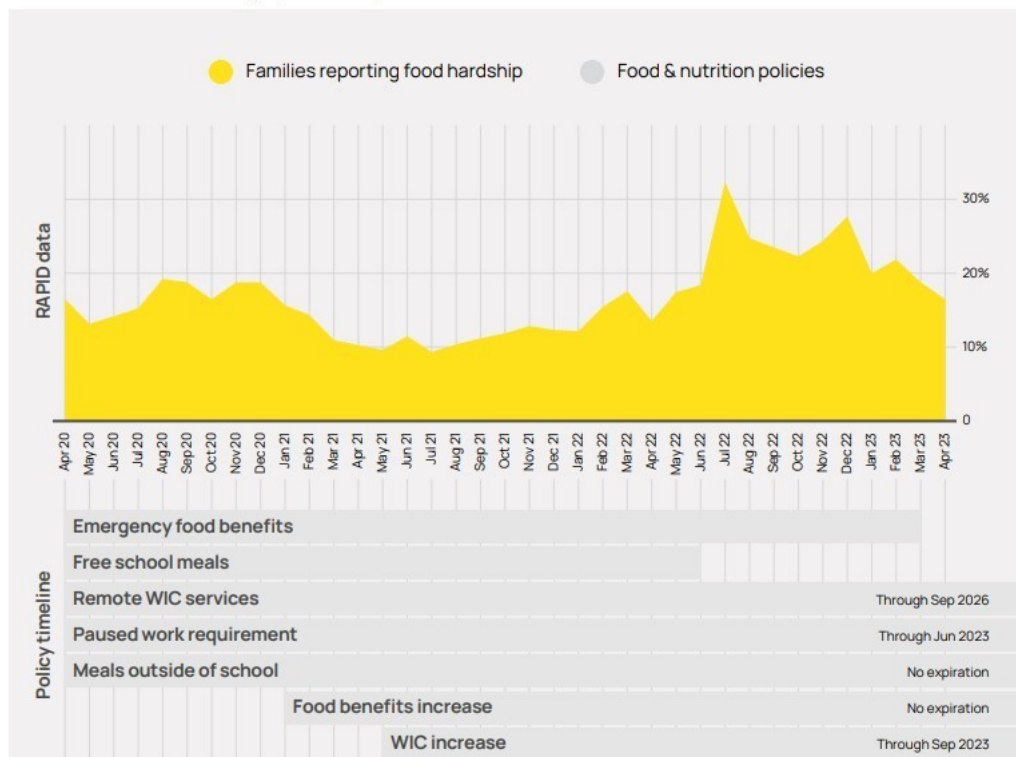


Figure 2. Percentage of participants who indicated food hardship.

that we are coming out of that period, young families are not in the clear. Our Rapid-EC survey has shown that in 2022, material hardship among families with young children leveled off at about 40%. Thus about 2 in every 5 families with young children reported having trouble paying for food, housing, utilities, or other essentials.

The first years of life are critical for life-long health, both mental and physical, and for how children will do in school and later in their chosen careers. Given the mounting evidence that conception to age 2 is a critical

period, it is astounding to note that this is when public investments in children are the lowest. During these first two years, as a society we invest about \$8,000 per child, most of which is for birth and medical expenses. Once a child starts school, this investment increases to about \$15,000/year. Indeed, we invest about one-ninth as much per year for each child in their first 5 years as we do for their next 13 years.

Please check out the RAPID-EC fact sheets on their website. <https://rapidsurveyproject.com/>

---

## Thriving Despite Childhood Exposure to Neighborhood Violence

By: *Bria Gresham*

Community violence exposure is a pervasive public health problem that affects some neighborhoods more than others. Sadly, community violence often tracks with the wealth or poverty of the neighborhood, with higher violence in lower income neighborhoods. Children reared in neighborhoods with significant community violence often suffer trauma that increases their risk for emotional and other psychological problems. Trauma also impacts children on a biological level, influencing the activity of very powerful stress systems. In our research group we study the main stress hormone system, the hypothalamic-pituitary-adrenocortical system, HPA for short. This system produces cortisol a powerful hormone that has anti-inflammatory effects (which is why you put cortisone ointment on rashes), mobilizes the body's energy stores by breaking down our protein stores, including muscles, and acts in the brain to retain memories (often flashbulb) of traumatic experiences.

A history of exposure to community violence challenges many university students who are the first in their families to go to college (FIRST-

GENS). Many first-gens grew up in neighborhoods with fewer resources, ones sometimes plagued with more violence. I was a first-gen college student who is now working on a Ph.D., and I know about the challenges faced by these students. I also know that many are very resilient and have learned ways to cope with many challenges, including the challenge of exposure as children to violence in the neighborhoods they grew up in. It is their coping strategies that I am studying in my "Coping with Previous Experience" (CoPE) study. I am examining whether community violence exposure predicts internalizing (anxiety, depression) symptoms and stress hormone responses to a public speaking stressor in college-aged individuals. More importantly, I am studying how the coping strategies participants use may modify the link between childhood exposure to violence and emotional problems in young adulthood. If we understand the coping strategies that work to protect the psyches of children exposed to violence, then we can design programs that will protect more kids.

Participants in the CoPE study are first-generation college students (i.e., neither parent/guardian having



Bria Gresham, Ph.D. candidate, Institute of Child Development, University of MN

obtained a 4-year college degree) aged 18-25 years. The study is done completely on-line so participants can be from any location across the United States. Participants need to have a computer with internet connection on which they can join the session via ZOOM and a quiet place where they can be during the study, which includes a brief speech and a math task. Participants collect saliva multiple times during the session using a kit we provide and they mail the spit samples back to us. As strange as it seems, the stress hormone our body produces gets into our saliva, so saliva can be assayed to measure how much bodily stress we are under. Participants are paid for their participation. Interested in learning more or participating? Contact us at [copestudy@umn.edu](mailto:copestudy@umn.edu) or call us at 612-504-5142.

# Friends, Peers, & Stress Study (Share the Load)

By: Bonny Donzella

**Share the Load: Carry on, we are almost there!** The hormone cortisol helps the body cope with challenges. For example, it prepares calories for ready use, as one would need to face the extra effort of some stressor. We know that cortisol responses change over development, and we know that social relationships are powerful buffers of stress hormone activity.

The first relationships that buffer stress are the child's relationships with parents. But as children approach puberty and beyond, parents are less effective at lowering their child's stress hormone production when facing a challenge, like giving a speech. Given that the teen years are a time of vulnerability to anxiety and depression, it is interesting that this is also the time when they lose their stress buffers.

Or, do they? Perhaps this is a period of social development where friends step in to help with stressful challenges, in the same way that parents do for younger children. In the Share the Load Study, we want to learn about the roles that friends and peers play in potentially buffering a stress

response in youth all along the range of pubertal development. Some participants are randomly assigned to do the study alone, some with another unfamiliar peer and some do the study with a friend.

With your help, we've been collecting data at a rapid pace since the start of 2022. Our goal was to have 200 sessions, with about 75% of those sessions having two youth participants. To date, we have preliminary results from 270 participants. We can report a couple of interesting findings. First, we wanted to be sure our challenge of conducting a speech and math task in front of judges actually produced a cortisol response. In other studies, the task produces a response for about 70% of the participants. To check, we only considered the standard condition, where the participant does the task alone, with no social buffer. And, whew!, the task works as expected. Seventy percent of our participants elevated their production of cortisol in response to giving a speech and doing math in front of judges.

There is a second preliminary finding that we could report: social buffering appears to have very different effects for boys than for girls. We would love to tell you more, however, we are still collecting data and don't want to influence any future findings. Oh, the suspense! We've decided to strive for a larger enrollment in order to confirm this potential sex difference. By this time next year, we will be able to share our final results!

We are still looking for participants to join us! The entire study takes place online, using Zoom, and participants can earn up to \$70 and parents can earn up to \$20. Contact us at [sharetheload@umn.edu](mailto:sharetheload@umn.edu).



Photo by Jacob Lund Photography from Noun Project

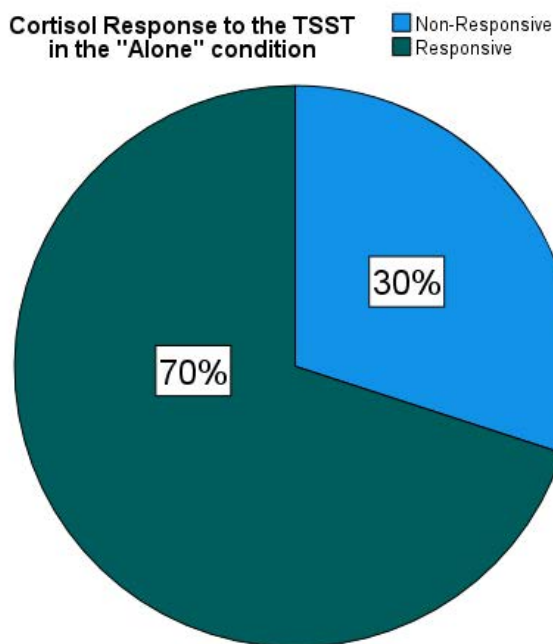


Figure 3. Seventy percent of participants had an elevated cortisol response to giving a 5-minute speech and doing math in front of judges.

# Brain Study of Stress & Social Support

By: Zach Miller

We are thrilled to report that our Brain Study of Stress & Social Support has completed all data collection. Our journey has been enriched by the participation of over 200 families who joined us for testing sessions at the University of Minnesota's Center for Magnetic Resonance Research. Of the 208 children who participated, 108 were female and 100 were male, and they were accompanied by their mothers 88% of the time and their fathers 12% of the time. To all the families who dedicated their time and efforts to our research, we extend our heartfelt gratitude.

In this study, families completed a number of questionnaires before coming to the MRI scanning facility in-person. During the testing session, children provided saliva samples throughout the 2.5-hour visit which we use to measure cortisol, a stress hormone in the body. They also completed an MRI scan where they were presented

with math problems and asked to respond with the correct answer. This scan is first conducted with additional stressors and then repeated without any added stress.

What we can share at this juncture is that the impact of stress on cognition matches some of our hypotheses. Figure 4 shows regional brain activity variations during the performance of mathematical tasks under stress versus under normal conditions. The brighter regions within these images signify heightened neural activity, indicating increased cognitive exertion when faced with stressors. Among other regions, we can see significant activity within the amygdala (crosshairs), a region associated with stress responses. Our preliminary analyses underscore the robustness of our experimental task and the coherence of our data.

Your involvement and support



are vital to the advancement of science! Please consider joining us in related scientific endeavors. We are actively seeking participation from 11–14-year-olds in [another research study](#). To check your eligibility and become a part of this work, kindly reach out to us via email at [socialbuffering@umn.edu](mailto:socialbuffering@umn.edu) or give us a call at 612-626-8949.

Together, we can make a difference in the field of neuroscience. Join us on this remarkable expedition, and let's unlock the mysteries of stress and social support in the brain!

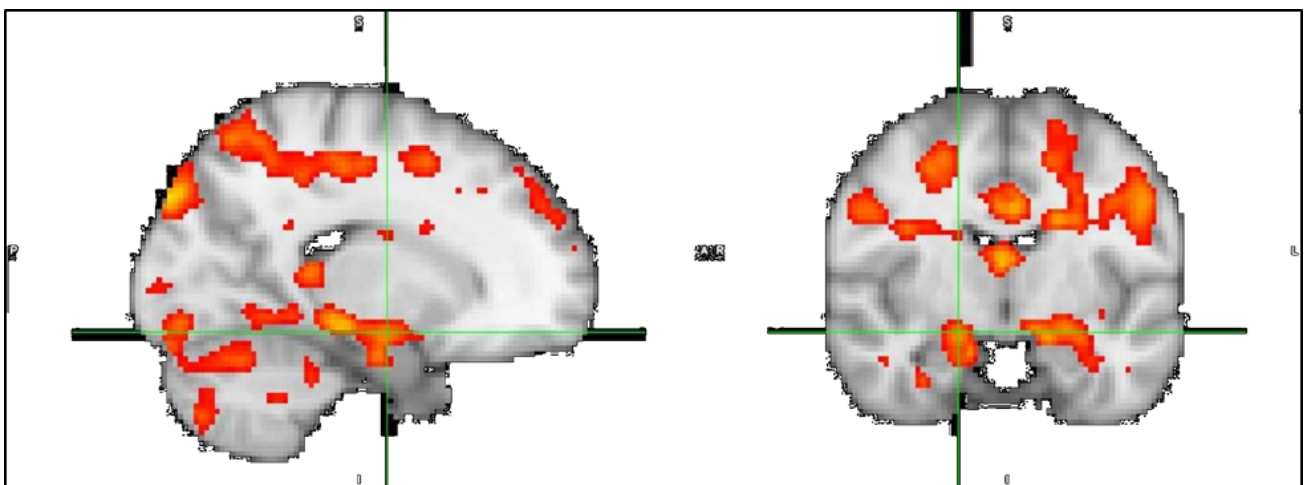


Figure 4. Regional brain activity variations during performance of math tasks while under stress vs normal conditions. Brighter regions indicates increased cognitive energy when faced with doing hard math.



# Examining Adolescents Stress Effects

By Clarissa Filetti

Unsplash.com

Adolescence is a developmental period of both heightened opportunity and risk. During this period, adolescents show marked changes in their social behavior as they begin to spend more time with peers, and subsequently away from their family, and begin to form their social identities. However, adolescents also become more sensitive to peer evaluation and thus more vulnerable to social evaluative threat (for example: giving a speech in front of a crowd), while at the same time their physiological stress response systems become more reactive. Over many years of research, we have learned that the support of social partners, termed social buffering, provides protection from

stress.

In childhood, parents play a powerful role in buffering their children's stress, however, parents become less effective in buffering stress as their children experience puberty and transition to adolescence. Most of the research studying parental social buffering during adolescence has only examined how parents' presence and verbal support affects their adolescent's stress response. Which leads to our question – *does physical comfort from parents buffer stress reactivity in adolescents?*

In the Examining Adolescent Stress Effects (EASE) study, we are testing this question by inviting adolescents, aged 14-17, to

participate in two research sessions, one over Zoom and one in person at the Institute of Child Development (ICD). At ICD, participants will undergo a laboratory task with their parent who will be randomly assigned to one of three conditions: 1) parent will be in the same room as their child, 2) parent will be in the same room as their child and providing physical comfort, and 3) parent will not be in the same room as their child.

This study has recently started, and we are looking for participants to join us! Participants can earn up to \$35 for their time. If you are interested, please contact us by email at [EaseStudy@umn.edu](mailto:EaseStudy@umn.edu) or by phone at (612) 217 – 2880.

# PARTICIPATE IN RESEARCH

UNIVERSITY OF MINNESOTA

## RESEARCH PARTICIPANTS NEEDED



Coping with Previous Experience (CoPE)

Receive **\$25** for completing 2 study sessions

**You might be eligible for this study, if you are:**

- A first-generation college student  
[Neither parent/guardian has a 4-year degree]
- Between 18-25 years old

### Details

- Online via Zoom
- Flexible with your schedule
- Introductory session (~1 hr)
- 2nd session includes a short speech & math task (~1.5 hrs)



If you are interested, please scan the QR code to complete a brief interest form



FOR MORE INFO PLEASE CONTACT US

612-504-5142  
copestudy@umn.edu

CoPE Study Interest Form



Are parents or friends able to buffer children and teens from stress?

Participants, parents and/or friends will be compensated for their time

Free parking provided

## Brain Study of Peers, Parents, and Stress

Recruiting 11-14 year olds for participation in a research study

We are recruiting children/teens for one 1-hour online session and one 2.5 hour visit to the University of Minnesota. For one of those visits, participants will complete an MRI scan during which they will view different emotional (positive, negative, neutral) pictures. We will measure heart rate, breathing rate, and hand sweat during the MRI. We will collect saliva and hair samples to measure stress hormones. Some participants will be asked to invite a good friend to come along. A parent or friend will sit with the participant to provide social support.



SCAN ME  
To fill out an interest form

Call or email for more information!  
[socialbuffering@umn.edu](mailto:socialbuffering@umn.edu)  
612-626-8949

## Friends, Peers, and Stress Study

Recruiting 11-14 year-olds for participation in research study



Are friends able to help buffer children and teens from stress?



We are recruiting children/teens for an online study through the University of Minnesota. This will consist of 2 Zoom meetings totaling 3 hours (the first call is 30 mins, the second call is 2.5 hours). Some participants will be asked to bring a good friend to join them on the Zoom call, and some will be paired with an unfamiliar peer. Participants will complete a short public speaking task and provide saliva samples to measure hormones.

- This study will be held entirely online over zoom calls.
- Participants and friends will be compensated for their time.



SCAN ME  
To learn more!

Call or email for more information!  
[sharetheload@umn.edu](mailto:sharetheload@umn.edu)  
612-524-9903

## RESEARCH PARTICIPANTS NEEDED

### The EASE Study

Examining Adolescent Stress Effects: How Parents Help Their Children Cope with Physical Discomfort



We are recruiting 14-17 year-olds and their parent

Participants will be asked to attend two research sessions:

#### Session 1:

- Online over Zoom (~1.5 hrs)
- Answer questionnaires
- Complete a story-telling task

#### Session 2:

- In-person at the University of Minnesota (~2.5 hrs)
- Complete a laboratory task (submerge hand in ice water for up to 3 minutes)
- Your parent may or may not be present during the lab task
- Provide saliva samples
- Answer questionnaires

Your family will receive up to \$35 as thanks for your participation



Interested? Fill out our form and we'll reach out to you!

Or, contact us at: (612) 217-2880  
[EaseStudy@umn.edu](mailto:EaseStudy@umn.edu)



# PARTICIPATE IN A RESEARCH STUDY OF GENDER AND FLEXIBLE THINKING!



You and your 5–8-year-old child can help researchers at the University of Minnesota explore links between gender, flexible thinking, and creativity!

Participants will:

- Meet virtually or in person for one hour with a study team member to have a discussion and do some activities
- Share their ideas about gender and creativity
- Receive \$25 as a thank you

Call or email for more information!

[genderflex@umn.edu](mailto:genderflex@umn.edu)  
612-699-3539



To fill out an interest form

# JOIN THE ICD PARTICIPANT POOL



The ICD Participant Pool is a central database for research labs in ICD.

Researchers use the database to contact local families about taking part in studies. Agreeing to be in the participant pool only means that researchers may call or email your family. Register your child today to receive news on research opportunities.



[REGISTER NOW](#)



## Gunnar Lab and Staff

### PRINCIPLE INVESTIGATOR

Megan Gunnar, *Regents Professor*

### STAFF & STUDENTS

Bonny Donzella, *Senior Research Fellow*

Annika Knutson, *Research Associate*

Lily Michaud, *Research Associate*

Zachary Miller, *Staff Researcher*

Shanna Mliner, *Senior Research Fellow*

Bao Moua, *Principal Lab Tech*

Nikola Tsakonas, *Staff Research Associate*

Maya Bowen, *Graduate Student*

Clarissa Filetti, *Graduate Student*

Bria Gresham, *Graduate Student*

Maddie Fung, *Graduate Student*

Mariann Howland, *Graduate Student*

Finola Kane-Grade, *Graduate Student*

Mirinda Morency, *Graduate Student*

### COLLABORATORS & PARTNERS

Phil Fisher, *Professor, Stanford University*

Brie Reid, *Research Investigator, Brown University*

Emmy Reilly, *Post-doc, Duke University*

Katie Thomas, *Professor, ICD*

Danruo Zhong, *Research Scientist, New York University*

Center for Magnetic Resonance Research  
Center for Neurobehavioral Development  
International Adoption Project  
Institute of Child Development Participant Pool  
Masonic Institute for the Developing Brain

### ONLINE EDITION

[www.innovation.umn.edu/gunnar-lab/](http://www.innovation.umn.edu/gunnar-lab/)

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 or by emailing [IAP@umn.edu](mailto:IAP@umn.edu) or call 612-626-8949.



Institute of  
Child Development

UNIVERSITY OF MINNESOTA

**Driven to Discover®**