

Temperament Over Time Study

University of Maryland

The Temperament Over Time Study (TOTS) at the Child Development Lab is a longitudinal study investigating the effects of individual differences in temperament across development. Funded by the National Institute of Mental Health, the longitudinal design of TOTS allows us to follow the same participants at different points in time to look at changes across development. This type of study would not be possible without the continued support and involvement of the participants and their families!

New Assessment!

Our 15-year assessment has begun and we are very excited about the new opportunities that we have for you and your child. If your child is 15-16 years old and you have not heard from us, please give us a call at (301) 405-2835.



Overt Behaviors

- Opportunity to observe social behaviors as they occur in the real world
- Allow us to generalize the findings to real-world settings



Cognitive Tasks

- Introduces greater laboratory control
- Assesses executive control and attention



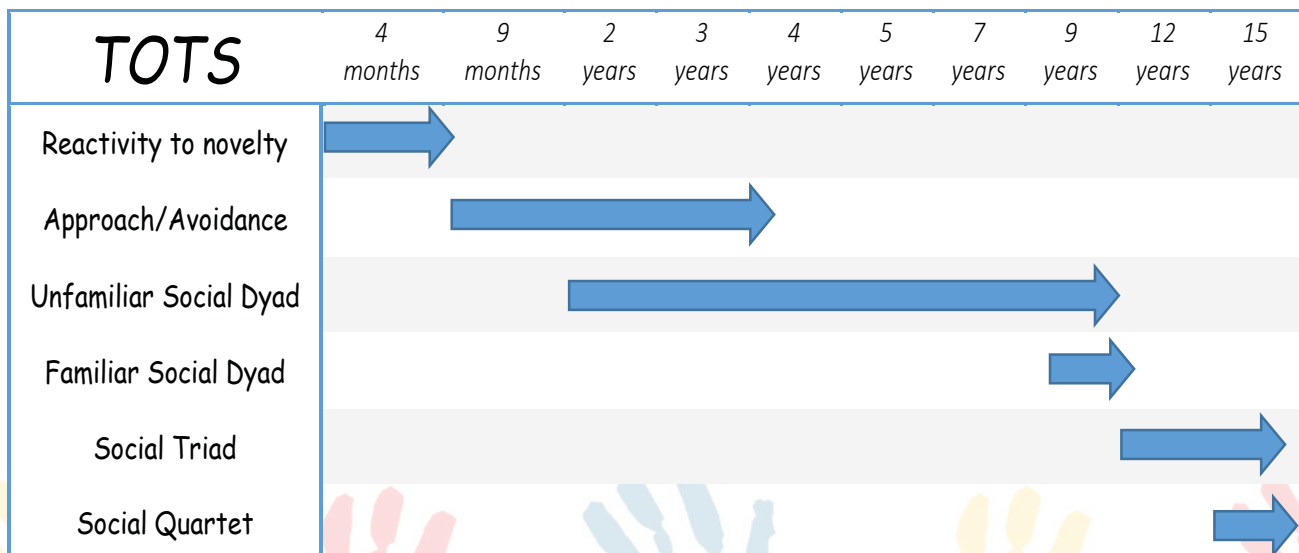
Psychophysiology

- Targets underlying psychological mechanisms
- May present vulnerabilities which are not yet evident in overt behavior

Our research aims to answer several questions such as, "To what extent does temperament influence children's behavioral, cognitive, and social development?"

2018 Newsletter

We began the TOTS study in 2001 by recruiting a group of 4-month-old infants, many of whom have continued to participate over the years. Additionally, many more children have joined the study along the way! We are currently in the midst of the 15-year TOTS visit in which we are using multiple methods to measure various behaviors. Some of these measures have been used in previous phases of TOTS, while some are brand new to the 15-year visit.



What have we studied so far?

Infants and children display different emotional and behavioral reactions to their environment. These profiles of reactivity are called temperament and they affect babies' sleeping, eating, and responsiveness to the world around them.

Temperamental differences can also influence the ways young children interact with their peers in social settings, such as playgroups, daycare, or school.

To understand how temperament is related to cognitive development, we use observational measures as well as measures of brain activity. During visits to the lab, participants play various computer games while wearing an EEG net, which records brain activity across the scalp. To understand how temperament is related to social development, we observe participants interacting with same-age peers.

Infant Reactivity to Novelty

When the participants were 4 months and then 9 months old, we observed their reactions to novel objects and stimuli, such as new toys and sounds.

Results: We found that infant reactivity falls into three distinct reactivity groups: little emotion or movement (average), fussy (negative), or excited (positive).



Exuberance

The TOTS study assessed exuberance at 4 months, 9 months, and 2 and 3 years of age. We observed participants' positive reactivity and emotions, approach behavior, and sociability while playing with various objects (including a trampoline and toy snake). Exuberant children are typically characterized as outgoing and positively reactive to new people and things.

Results: High exuberance was associated with greater social competence when engaging with a peer at age 5.

Behavioral Inhibition

Behavioral inhibition is a temperament style characterized by social reticence (shyness), heightened sensitivity to new people and things, and avoidance of unfamiliar adults, peers, and situations.

During TOTS visits at 2 and 3 years of age, we observed whether toddlers would approach or avoid unfamiliar stimuli by presenting them with unfamiliar objects. In general, infants who displayed this negative reactivity response also showed a behaviorally inhibited temperament.



Social Problem Solving

While interacting with unfamiliar peers, children's social problem-solving behaviors were measured during visits at 2, 3, 4, 7, and 12 years of age. During these visits, children were asked to share toys and/or objects. We observed their social problem-solving strategies, as well as the emotions they displayed during the interactions. For example, at age 7 we observed children's behaviors while they were excluded from tossing a ball with an unfamiliar peer and an experimenter.

Results: Some shy children were less likely to be proactive in asking for a turn with the toy or when sharing it.





We aim to understand how emotions and cognitive skills influence each other over time.

Attention Bias to Threat

Young children rely on the facial expressions of those around them to make sense of information being communicated to them.

At age 5, children played a computer game in which they were shown threatening pictures (e.g., an angry face) and then a neutral cue, either on the same side of the screen as the angry face or on the opposite side.

Results: Children who were wary in toddlerhood remained wary at 5 years old. These children tended to respond faster to the game when the threatening picture was on the same side of the screen as the neutral cue.

Similar tasks were repeated at different ages. Observing the same behaviors at multiple ages allows us to better understand the trajectories of behaviors over the course of development.

Inhibitory Control

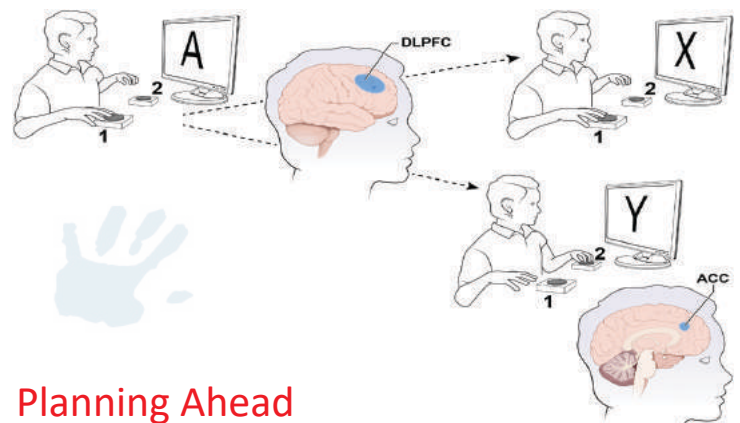
At ages 7 and 9, children played a zoo-themed game requiring them to press a button when they saw any animal except a monkey appear on the screen. This task was used to measure the children's inhibitory control, which is a person's ability to resist impulse and respond appropriately. Additionally, the task measured children's ability to detect and monitor the mistakes they made during the game.

Results: Behaviorally inhibited toddlers display greater inhibitory control at 7 and 9 years of age. This type of regulation may make a child better at tasks where they need to control their behavior but could make social interactions more difficult.

Error Monitoring

At the 7 year visit, children played a challenging computer game in which they had to respond to specific images that appeared quickly on the screen. We observed the extent to which children monitored and reacted to making errors using EEG technology. Children who were behaviorally inhibited as toddlers were more likely to have increased neural markers of error monitoring at age 7.

During previous TOTS visits, we found that certain areas of the brain showed increased activity when a person makes a mistake. Changes in the brain can be observed in less than a tenth of a second after we make a mistake! This diagram is an example of an error monitoring task similar to the one being completed at the 15-year visit.



Planning Ahead

During the 12-year visit, children completed a computer-based planning task. We measured how children used the information given in advance to complete the planning task.

Results: Children who were behaviorally inhibited as toddlers were less likely to use information given in advance to plan ahead for future actions.

At the 15 year visit, participants are repeating this same task while wearing an EEG net. We are using EEG to investigate what is going on in the brain when children do and do not plan ahead and how these patterns are related to temperament.

The 15-year assessment has begun!

Social Interaction:

Participants engage in a social interaction with male and female peers their same age. As children become adolescents, their social interactions become increasingly complex and more frequent. We are observing how adolescents navigate different types of social situations! Participants and their friends are monitored with an electrocardiogram (ECG or EKG). This equipment allows us to view the participants' autonomic nervous system (ANS) in response to given tasks. The presence of the friend allows us to compare the effects of having a familiar peer during tasks, versus tasks not involving the friend.



Home Interview:

Parents and children have the opportunity to participate in an at-home interview to assess psychological functioning. We have offered this opportunity at multiple visits over the years. Repeating this measure helps us to assess any changes as participants develop from childhood to adolescence.

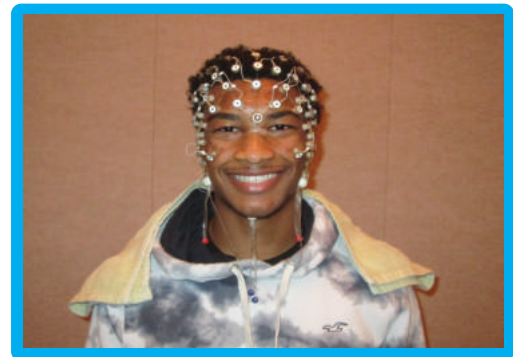
National Institute of Mental Health:

We invite everyone to participate in a brain imaging (fMRI) assessment through our partner lab at the National Institute of Mental Health.



Electroencephalography:

Teens will complete two computer-based planning games while we use EEG to measure brain activity. The purpose is to follow up on a pattern we saw during the 12-year visit and to determine if teens who were behaviorally inhibited as toddlers show different brain activity when planning for the future.



Questionnaires:

During this phase, teens and their parents complete a series of questionnaires for a broader view of the teens' behaviors, emotions, and social relationships.

Daily Survey:

Participants will be asked to use a smartphone app to complete a "Daily Survey", which will prompt them to respond to questions about their emotions and social interactions everyday for a week. This data will provide a unique insight to adolescents daily experiences.

We may contact you about some or all of these opportunities. As always, you are welcome to participate in any, all, or none of the study components.