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TODDLER IRRITABILITY AS DISTINCT  
FROM TYPICAL TODDLER ANGER REACTIVITY

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## ABSTRACT

**Background:** Irritability, defined by frequent, extreme, unpredictable anger outbursts including temper tantrums, has recently gained interest among researchers (Stringaris, Zavos, Leibenluft, Maughan, & Eley, 2012; Leibenluft, 2011). Yet little is known about the developmental course of irritability throughout childhood and whether and when it is a clinically meaningful factor distinct from the normative anger reactivity of toddlers. The first aim of the thesis is to determine whether irritability can be differentiated, from anger reactivity, as a unique and coherent factor in a group of 27-month-olds ( $M = 27.45$ ;  $SD = 1.33$ ). The second aim is to test the validity of the irritability construct by examining the extent to which toddler irritability was related to the degree and extent of anger children show during a variety of tasks. **Methods:** The sample is composed of 546 toddlers and their parents, participants in an NIH-supported longitudinal study, the Early Growth and Development Study (EGDS). For Aim One, a selection of parent-reported ratings of toddler characteristics was analyzed using Principal Components Analysis (PCA) to determine if irritability could be distinguished from anger reactivity. For Aim Two, the Irritability and Anger scales, based on the PCA results, were correlated to independent observations of the toddlers in three laboratory procedures that varied in the likelihood they would elicit frustration. **Results:** The PCA yielded two factors—one that was labeled Anger and a second one that was labeled Irritability. The Irritability scores comprised six items from mother reports, and seven items from father reports, of toddler behavior. The Anger score reported by mothers and fathers was positively correlated with the frequency of aversive behavior during the clean-up task ( $r = 0.20$ ,  $p < .01$  and  $r = 0.27$ ,  $p < .01$ , respectively) and mothers' report of toddlers Anger was positively correlated with the ratio of negative affect during the waiting activity ( $r = 0.12$ ,  $p < .05$ ). The Irritability score was not related to the child's

behavior during the observational tasks, with the exception of father reports of toddler Irritability, which was modestly but significantly correlated ( $r = 0.13$ ,  $p < .05$ ) with the duration of child distress during the free play task. **Conclusions:** Toddler irritability is related to anger reactivity but emerges as a unique component based on parent ratings of child behavior. This factor appears to reflect toddler anger that is more intense, less predictable, and more frequent. However, it was not related to observed toddler behavior, with the exception of fathers' report of irritability being related to the length of time toddlers were distressed during a task that most children find pleasant.

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## Chapter 1

### Introduction

Irritability, defined as frequent, extreme, and unpredictable anger outbursts including temper tantrums, represents a form of anger dysregulation that precede the development, not only of externalizing disorders, but also the development of mood disorders (Leibenluft, 2011; Rowe, Costello, Angold, Copeland, & Maughan, 2010; Stringaris, Zavos, Leibenluft, Maughan, & Eley, 2012). Aspects of young children's anger and anger regulation have been identified as a risk factor for developing behavior disorders such as Oppositional Defiant Disorder and Conduct Disorder. Irritability, which is associated with anger, has gained recent interest in the clinical science community because of its prevalence as a symptom of childhood psychopathology and because it has been identified as a form of anger dysregulation that signal risk factor for later psychopathology (Dougherty, Smith, Bufferd, Stringaris, Leibenluft, Carlson, & Klein, 2013; Stringaris, 2011). In addition, irritability is shown to predict mood disorders in children and adolescents (Stringaris, 2012; Dougherty et al., 2013). Given its clinical significance, there is interest in identifying irritability that signals risk early in childhood before disorders gain traction. But little is known about irritability throughout childhood and at what ages it can be regarded as a clinically meaningful risk factor.

Anger reactivity, i.e. responding to blocked goals and frustrated rewards quickly, is common during toddlerhood and the early preschool years (Campbell, Shaw, & Gilliom, 2000). However, recent work has considered that even during a normative period there may be individual differences that distinguish typical developmental trajectories from those that are atypical. That is, among toddlers, certain forms of irritability may signal risk for atypical

development. Therefore, it is important to determine if toddler irritability is a risk factor distinct from the typical angry reactivity of toddlers.

Irritability has been identified as a risk factor in school age children, particularly in regard to the development of mood-related disorders (Dougherty et al., 2013). Irritability in school children has been assessed using parent descriptions of the child as always angry and as reacting with intense anger, especially in situations in which anger would be unexpected (Stringaris et al., 2012). Although it is commonly assumed that temper tantrums and anger dysregulation are normative misbehaviors during toddlerhood, recent evidence suggests that irritability is indicative of risk may be apparent in young children. That is, evidence indicates that young children's temper tantrums vary in presentation and some presentations may be clinically meaningful; for example, most 3- and 4-year-olds (83.7%) have temper tantrums, get angry and misbehave in expectable, frustrating situations, but only 8.6% have daily tantrums and intense anger, including in situations in which anger is not expected (Wakschlag et al., 2012). Therefore, it is possible that individual differences in toddler anger reactivity may include subgroups of children who are highly irritable in both predictable and unpredictable contexts. If so, it would suggest an opportunity for earlier prediction of pathways to future psychopathology and a potential target for preventive interventions. However, little research has been done on irritability prior to school age, and it is unclear whether irritability can be discerned as early as toddlerhood. Therefore, the current study aims to determine whether irritability can be discerned as early as toddlerhood and, if so, whether toddler irritability relates to independent observations of toddlers anger during tasks that vary from typically anger-eliciting to typically enjoyable.

Irritability as a symptom within the Diagnostic and Statistical Manual (DSM-V) cuts across many disorders that span the internalizing and externalizing divide such as Attention

Deficit Hyperactivity Disorder, Disruptive Mood Dysregulation Disorder, generalized anxiety disorder, and major depressive disorder (Stringaris, 2011; American Psychiatric Association, 2013). Because irritability is observed for both internalizing and externalizing disorders, it is useful to better understand its nature and its development, including as a potential risk factor for later psychopathology. This goal is consistent with more recent trends in studying psychopathology. The transdiagnostic approach (Krueger, & Markon, 2006; Achenbach, & Edelbrock, 1984) would regard irritability as an indicator of atypical psychological processes that are not specific to any one disorder, and understanding its development would yield more insight into emotional dysregulation.

Limited information is known about the nature and development of irritability. A recent study found five different groups of irritable children with different developmental trajectories from 3 to 9 years old; one group had high irritability that decreased to normal levels by age 9 (5.4%), two groups that had low decreasing (60.8%) or moderate decreasing irritability (21.0%) and two groups that had more severe trajectories with high irritability that either remained stable (10.6% of sample) or increased overtime (2.2%; Wiggins, Mitchell, Stringaris, & Leibenluft, 2014).

In addition, recent studies have indicated irritability as a candidate risk factor for later psychopathology. Irritability during adolescence predicts subsequent symptoms of major depression, dysthymia, and generalized anxiety disorder but not symptoms of ADHD or bipolar disorder in a 20-year follow-up study (Stringaris, & Goodman, 2009). In children, chronic irritability in 3-year-olds is concurrently related to ADHD, Oppositional Defiant Disorder (ODD), depressive disorder, and anxiety diagnoses, and after controlling for baseline symptoms, it predicts depression and ODD by age six (Dougherty et al., 2013). These findings suggest that

irritability as early as age three is implicated in both internalizing and externalizing symptoms in children and mood-related symptoms in adults. Therefore determining whether irritability exists as a coherent, unique factor in toddlerhood is warranted.

### **Irritability and anger dysregulation**

In order to understand irritability as a risk factor for later psychopathology, it is important to understand irritability as a potential form of anger dysregulation manifested by temper tantrums and disruptive, disobedient behaviors during toddlerhood (Kreiger & Leibenluft, 2013). Emotion regulation is a major milestone that develops throughout the lifespan and makes significant transitions as children emerge from toddlerhood and reach the preschool years. That is, children's self-regulation of their emotional reactions emerges during the third year, revealing their developing ability to conform to social conventions and to comply with social demands even when these oppose their personal desires (Kopp, 1989; Cole, Michel, & Teti, 1994). By the time children enter kindergarten they are expected to be able to engage in self-regulation of ordinary frustrations and disappointments; they are expected to manage their behavior such that they sit and listen to lessons, avoid aggressive conflicts with peers, and obey the rules of the classroom (Duncan et al., 2007). However, even prior to kindergarten, adults begin to communicate these expectations to toddlers. For example, toddlers are taught to obey their parents (e.g., clean up your toys) and to control their defiance or frustration when they have to wait for a parent to give them something they want. Toddlers nonetheless express anger and have tantrums affording opportunities for parents and educators to teach them about social rules and conventions, guiding them in the process of self-regulation (Kopp, 1982). As a result of the inability to regulate their emotions, toddlers may present behavior problems such as noncompliance, temper loss, and aggression. These behaviors are difficult to delineate during

toddlerhood because they are seen as normative misbehaviors. It is particularly challenging to determine whether a tantrum is clinically meaningful because it is not uncommon for healthy children to periodically experience severe excessive or maladaptive tantrum behaviors and in clinical samples of children referred for behavior problems (Belden, Thomson, & Luby, 2008). Given this normative pattern, clinically concerning toddler irritability may be distinguishable from typical toddler anger based on the context in which the child becomes irritable. That is, while most toddlers would become angry when their goals are blocked, e.g., they are not allowed to do something they want to do, it is not usual for toddlers to become very angry in more pleasurable circumstances. We expect young children who are irritable to not only express anger when their goals are blocked (e.g., they cannot have a toy they want) but also to become angry in situations in which most toddlers would not, e.g., during a free play with a parent in which there are few demands on the child and the parent is following the child's lead in the play (Keenan & Wakschlag, 2000). Many studies use a dimensional approach to studying temper tantrums and anger dysregulation in younger children and using a continuum helps to clarify the line between normative variations and clinical concern (Cole, Michel, & Teti, 1994). Recent investigation using a dimensional approach for disruptive behaviors found a continuum for the severity of temper loss, ranging from normative misbehaviors to problem indicators, in a diverse community sample of 3-5 year olds (Wakschlag et al., 2012).

Because the concept of irritability as different from anger reactivity, and a clinical risk factor, is relatively new in clinical science, a challenge is developing measures of irritability that are valid and in a developmentally sensitive way. One approach is to collect information from caregivers, particularly parents, teachers, or children themselves. In the case of toddlers, the best informants are likely to be parents. Parents who participate in research studies with their

children often complete rating scales describing their children, such as symptom checklists and temperament ratings. In the first work on childhood irritability, a scale was first developed using items from these types of scales (Stringaris et al., 2012). The resulting Affective Reactivity Index is an irritability scale that was developed to identify irritability. Using items from other rating scales, seven item parent- and self-report scales (for youth ages 5-18,  $M = 12.9$ ) were generated. The seven items were: easily annoyed by others, often loses temper, stays angry for a long time, angry most of the time, gets angry frequently, and loses temper easily; the scale has excellent internal consistency and external validation (Stringaris et al., 2012). The parent-reported irritability only was predictive of emotional problems and irritability was predictive of conduct problems (Stringaris et al., 2012). Based on the work on the Affective Reactivity Index, the present study took a similar approach to creating a factor based on items that may distinguish irritability from other anger-related symptoms or descriptors. Thus, the first aim of the thesis is to determine whether irritability is a coherent factor in a group of 27 month olds based on items selected from parent report questionnaires. A factor analytic approach was taken to address this aim.

Even if a factor that is distinct from normative anger is found, it is also necessary to demonstrate that it is reliable and valid. If a toddler irritability scale is valid then it should be related to objective assessment of toddler behavior. Thus, the second aim of the thesis is to test the extent to which a toddler irritability scale is related to toddlers' behavior during observational tasks, including both those that elicit anger in most children and those that are not designed to frustrate young children. Three tasks were chosen to validate the irritability scale: a free play, a clean up, and a waiting task. Each task should elicit different levels of anger in typically developing toddlers because of the contrasting restrictions placed on the child in each context. In

free play there are no restrictions placed on the toddler; the child is given a set of interesting toys and the parent plays with the child, placing no demands on the child but following the child's activity and participating as the child wishes (Calkins, Gill, Johnson, & Smith, 1999). The child's goals are not blocked and the parent is free to help the child as needed. However, an irritable child, we predict, would be more likely to become angry even in a non-challenging situation, and therefore, be distressed for a longer period of time during the free play task than a non-irritable toddler.

It is also possible that an irritable toddler's anger will differ from that of other toddlers during a task that may or may not involve a blocked goal. Evidence indicates that toddlers have varied responses to a compliance task requiring them to clean up toys with which they have been playing. Most toddlers comply (70%) in cleaning up the toys, whereas some toddlers are noncompliant without being disruptive (23%); a minority of toddlers are openly defiant, characterized by whining, kicking the toys, or having a temper tantrum (2%; Kochanska & Aksan, 1995). Thus, a clean-up task may distinguish the irritable toddler by being among the few who become very angry during this type of task and have more instances of aversive verbal and aversive physical behavior toward their parents.

Finally, we investigate the degree to which toddler irritability is associated with greater anger in a task that is frustrating for most typically developing children, specifically a waiting task was used. Asking a toddler to wait without interesting alternatives requires a very young child to tolerate and regulate frustration. It is known that when typically developing toddlers 18-24 months are asked to wait they express anger quicker and for a longer period of time compared to children 36-48 months, showing a developmental differences in a toddler's ability to tolerate frustration (Cole et al., 2011). Thus, a waiting activity sufficiently captures a toddler's anger at

27 months and therefore we predict that most toddlers get frustrated and express anger during a waiting activity, but irritable toddlers will express more frequent negative affect.

## Chapter 2

### Methods

#### Participants

The thesis sample was drawn from the Early Growth and Development Study (EGDS), an adoption longitudinal study. The full study follows two cohorts of 561 “linked sets” of adopted children, and their biological and adoptive parents, from the child’s birth forward (Leve, Neiderhiser, Shaw, Ganiban, Natsuaki, & Reiss, 2013). Recruitment for the participants involved the collaboration of adoption agencies in the mid-Atlantic, West/Southwest, and Pacific Northwest, and reflected the full range of agencies, public, private, religious, secular, those favoring more open adoptions and those favoring more closed adoptions (Leve et al., 2013 for more on the recruitment process). Just over half of the children are boys (56.3%) and the mean child age at the time of the adoption was 6.2 days ( $SD = 12.4$  days). More than half of the children (55.6%) are Caucasian and most adoptive mothers and fathers are Caucasian (62.5% and 61% respectively). Eighty two (7.3%) adoptive parents were same sex parents. The adoptive parents were typically college educated, 78.6% of mothers and 73.3% of fathers obtained at least a 4-year college degree (see Leve et al., 2013 for more sample characteristics from the EGDS).

For the thesis, data were drawn from the 27-month parent report questionnaires and home observations ( $M = 27.45$ ;  $SD = 1.33$ ; range 23.75 – 44.71). For Aim One, which focused on developing an irritability scale, 132 mothers and 121 fathers completed questionnaires about their toddler’s behavior and interviewers completed questionnaires about the toddler’s behavior in two at-home observations. Among the adoptive mothers, 3.5% were male and among the

adoptive fathers 4.2% were female. For Aim Two, which investigated the validity of the irritability scale, three observational tasks (free play, clean up, and waiting) were selected from the large number of procedures as part of the EGDS project. The observational task data were drawn from Cohort I of EGDS for the free play ( $n = 276$ ) and clean-up ( $n = 233$ ) tasks. The waiting task ( $n = 416$ ) uses data from both Cohorts I and II.

### **Irritability Scale Construction**

In order to determine whether a subset of items create a distinct irritability factor that can be used to form a reliable irritability scale, Drs. Pamela Cole and Jenae Neiderhiser selected 32 items from parent report scales used in the EGDS dataset. The set of 32 items was then reviewed by Dr. Ellen Leibenluft of the National Institute of Mental Health, a child psychiatrist who is a leader on understanding mood regulation disorders in children, including those that entail irritability (Leibenluft, 2011). As a result 32 items were taken from the Child Behavior Checklist 1½-5, Toddler Behavior Assessment Questionnaire (TBAQ), Infant Characteristics Questionnaire (ICQ), and interviewer impression ratings from a gentle arm restraint a waiting activity.

**Toddler Behavior Problems.** Both adoptive parents completed the Preschool Child Behavior Checklist (CBCL/1½-5), a 99-item rating scale in which the parent rates each problem behavior on a 3-point frequency scale, 0 (not true), 1 (somewhat or sometimes true), and 2 (very true or often true; Achenbach, & Rescorla, 2001). The items are designed to assess characteristics such as emotional reactivity, anxiousness/depression, somatic complaints, withdrawnness, sleep problems, attention problems, aggressive behavior, and other problems. The CBCL is a widely used measure for child internalizing and externalizing problems and has good validity and reliability (Achenbach, & Rescorla, 2000). For the purposes of the first aim of

this thesis, 6 items were selected from the Aggressive Behavior and Emotional Reactive subscales. The six items were: (1) easily frustrated, (2) angry moods, (3) stubborn, sullen, or irritable, (4) sulks a lot, (5) temper tantrums or hot temper, and (6) whining.

**Toddler Behavior Assessment Questionnaire.** Both adoptive parents also completed the Toddler Behavior Assessment Questionnaire (TBAQ), a 111-item rating scale in which each parent rates the frequency with the item describes the child on a 1-7 Likert rating scale (1 = never, 7 = always). In prior factor analyses, this instrument yields five factors: Activity Level, Pleasure, Social Fearfulness, Anger Proneness, and Interest/Persistence (Goldsmith, 1996). Each of the items is presented to the parent in terms how frequently they see the child engage in the behavior within the last month in specific situational contexts. Research has found the measurement to have internal consistency and inter-rater reliability, as well as convergence with other temperament measures (Goldsmith, 1996). The instrument also has support for construct validity (Kochanska & Knaack, 2003). Twenty items from the Anger Proneness subscale were selected for Aim One of this thesis.

**Infant Characteristics Questionnaire.** Both adoptive parents completed the Infant Characteristics Questionnaire (ICQ), a measure of infant temperament. Eleven of the original 24-items were used in the EGDS study (Bates, Freeland, & Lounsbury, 1979). Parents rate how difficult they experience the toddler's temperament to be on a 1-7 Likert scale (1 = very easy, 4 = about average, 7 = very difficult). The instrument has high test-retest reliability and acceptable levels of internal consistency (Hubert, Wachs, Peters-Marin, Gandour, 1982). One item from the Fussy-Difficult subscale was used for the initial analyses of the Irritability scale.

**Interviewer Impressions.** Interviewer impressions from two observational tasks were included in the initial 32 items for the analyses of the irritability scale. In the first task, the

gentle arm restraint, the experimenter presented the child with a new toy and let him or her play with it for 30 seconds the toy was then taken away and the parent restrained the child's arm for 30 seconds. This sequence is then repeated a second time. The toy was then given back to the child until they reached a happy or neutral state. The interviewer rated the child on a 1-4 Likert scale (1 = very true, 4 = not true). The items used for the construction of the irritability scale includes, "during the arm restraint, the child was frustrated" and "during the arm restraint, the child calmed down in between restraints."

The second procedure was the waiting activity, where mothers were instructed to have their child wait in a room with them without any toys to play for five minutes while they complete questionnaires (Trentacosta, Kaufman, Chaudhry, Khan, 2013). The interviewer rated the child for the waiting activity on a 1-4 Likert scale (1 = very true, 4 = not true). The item used for the irritability scale is "during the waiting activity, the child was upset."

### **Observations**

For Aim Two, three observational tasks were selected from the large number of procedures administered as part of EGDS. The three tasks that are the focus of the thesis are: free play, cleanup, and waiting activity that were designed to elicit varying levels of frustration. The lowest frustration task was a free play task, the moderate frustration task was cleaning up the toys at the request of the parent, and the higher frustration task was a delay task in which the toddler had to wait without any pleasant activity. Each task was completed twice, once with each parent, with the exception of the waiting task, which was completed only with the mother. The observations were conducted during a home visit when children were 27 months ( $M = 27.45$ ;  $SD = 1.33$ ; range 23.75 – 44.71).

**Free Play.** The free play is designed to see how parent and child interact during a typical context. It would be expected that the child would not react with frustration because it normally would be an enjoyable interaction. Both mother and father separately participated in a three-minute free play task. The child and parent were placed in a room with a doctor kit, a mini meal kit, and Legos. The experimenter was in the room organizing material for the next task but kept interacts with the parent and the child to a minimum. The items were rated by the interviewer on a five-point duration scale, 1 (not at all), 2 (less than a minute), 3 (1 - 2 minutes), 4 (2½ - 5 minutes), and 5 (5 minutes). The variables used for Aim Two measured duration of distress of the child for two different intensity levels, “how long was the child somewhat distressed? (Occasionally sob, etc.)” and “how long was the child actively distressed.”

**Clean up Task.** After the free play task, the parent was instructed to have their child clean up all the toys (e.g. put doctor toys back into case, Legos in the box, and everything placed in the bin) for five minutes. The parent was informed to make sure only the child cleaned up and to remind him or her as necessary. The clean up task is a common task used to assess child noncompliance and we would expect more anger from the child because it requires regulation of negative affect (Kopp, Vaughn, & Krakow, 1984; NICHD, 1998).

The task was coded from video using a four-digit, real-time microsocial coding system that indicated the initiator, initiator’s behavior, and recipient. The frequency of each behavior, duration of time spent in each behavior, rate per minute of behavior, and proportion frequencies are coded. Two individual coders coded the videos and the interrater reliability analyses using the Kappa statistic was performed to determine consistency among raters (Kappa = .76) and the average intercoder agreement was 73.3%. One variable used for this thesis is the frequency of child (initiator) to parent (recipient) for aversive physical, defined as any physically aggressive

behavior toward people or objects (e.g. child throws toy at parent, child kicks parent, child hits toy). The second variable used was child to parent frequency of aversive verbal, defined as any verbal aggression such as yelling, whining, crying, tantrum, and defiance (e.g. “No let’s not clean up.” or “No, I’m playing with that.”). If physical and verbal aggression occurred simultaneously, the physical aggression took precedence over the verbal aggression.

**Waiting Task.** The waiting task is a five-minute task in which the mother is instructed to have their child stay in the room with them, without any toys, while they complete a questionnaire (Trentacosta et al., 2013). It is designed to see how children respond when they have nothing to do. The waiting task is coded in 10-second intervals using a hierarchy of child affect. The videos were double-coded and interrater reliability analysis using kappa was performed to determine consistency among raters. The kappa for child affect was 0.84, which was calculated from 20% of the videos (88 of 448). The observational variable used for Aim Two is the ratio of intervals coded as child negative affect, which is characterized by crying, whining, frowning, pouting, fussing, or throwing a temper tantrum, as well as engaging in acts of physical aggression (e.g. hitting kicking, stomping, shouting angrily, etc.).

## Chapter 3

### Results

#### Overview of Aim One Analyses

A series of Principal Component Analyses (PCA) were run and the final PCA was run with the reduced number of items constrained to two factors. The resulting principal components analyses yielded two components for each parent. Inspection of the scree plots for each parent confirmed the logic of selecting only two components. The two-component model for mother data accounted for 30.05% of the variance, and the two-component model for father data accounted for 37.44% of the variance in the items. The items chosen for labeling the components had factor scores greater than 0.58. The first component was labeled Anger and the second component was labeled Irritability.

The Anger component comprised seven items for mothers and ten items for fathers (see Table 1a). Notably, all of the items for this component were from the Toddler Behavior Questionnaire, in which parents reported on their children's behavior over the past month. For mothers, the items loading on the Anger component were: protest not going outside by crying loudly, struggle when separated from toy, scream when removed something from him/her, protest for dessert by crying loudly, protest not getting toy in a whining tone of voice, protest nap by crying loudly, and protest nap by physically resisting or struggling. For fathers, the items loading on the Anger component were: protest not going outside by crying loudly, struggle when separated from toy, scream when removed something from him/her, protest for dessert by crying loudly, protest not getting toy in a whining tone of voice, protest nap by crying loudly, protest nap by physically resisting or struggling, showed anger because he or she wanted to do it, protest

not going outside in a whining tone of voice, and reversed follow request without anger when toy was removed.

To create an Anger scale based on this component, the items were added and divided by the number of items to create scale scores for mother and father separately. If the parent omitted a question their scale score was determined by adding the scores for the items they completed and then dividing by the number of items they completed. The mean Anger score for mothers was 3.34( $SD = 1.10$ ) with a range of 1.00 to 7.00. The mean Anger score reported by fathers was 3.43( $SD = 0.89$ ) with a range of 1.33 to 6.30. Mother and father Anger scores were then transformed to a z-score with a mean of 0.00 and a standard deviation of 1.00. Then the mother and father Anger scores were correlated using Spearman correlations and found to be moderately and significantly correlated ( $r = 0.40$ ,  $p < .01$ ).

The Irritability component consisted of six items for mothers and seven items for fathers (see Table 1b). One item (“how many times does your child get fussy and irritable per day”) for both the mother and father Irritability components was from the Infant Characteristics Questionnaire, in which parents rate how difficult they experience the toddler’s temperament. The remaining items for both mother and father were from the Child Behavior Checklist 1½-5, where parents rate their child’s behavior on a 3-point frequency scale. For mothers, the items loading on the Irritability component were: (1) how many times child get fussy and irritable per day, (2) easily frustrated, (3) angry moods, (4) stubborn, sullen, or irritable, (5) temper tantrums or hot temper, and (6) whining. For fathers, the items loading on the Irritability component were: (1) how many times child get fussy and irritable per day, (2) easily frustrated, (3) angry moods, (4) stubborn, sullen, or irritable, (5) temper tantrums or hot temper, (6) whining, and (7) sulks a lot.

To create an Irritability scale based on this component, the items were added and divided by the number of items to create scale scores for mother and father separately. If the parent omitted a question their scale score was determined by adding the scores for the items they completed and then dividing by the number of items they completed. The mean Irritability score reported by mothers was 1.77( $SD = .40$ , range = 1.00-3.5) and the mean Irritability score reported by fathers was 1.59( $SD = .37$ , range = 1.00-3.43). Mother and father scores were then transformed using a z-score, with a mean of 0.00 and a standard deviation of 1.00. The mother and father Irritability scores were correlated using Spearman correlations and found to be moderately and significantly correlated ( $r = 0.42$ ,  $p < .01$ ).

### **Overview of Aim Two Analyses**

Aim Two of the thesis was to determine whether toddler irritability was related to independent observations of the toddler behavior in three different tasks (free play, clean-up, and waiting tasks). Each of the chosen tasks was selected to vary in the degree to which they typically elicit frustration in toddlers based on the literature on emotion regulation, with free play being the least likely and waiting being the most likely. Toddler Irritability and Anger scores calculated for Aim One were correlated with the observational variable for each task using Spearman correlations (Table 3). In addition, paired sample t-tests were conducted to determine whether the variables “how long was the child somewhat distressed?” differed from “how long was the child actively distressed?” when the free play task was completed with the mother or father. The t-test revealed that the means for “how long was the child somewhat distressed?” for mother and father were not statistically different ( $t(299) = -1.89$ ,  $p = .06$ ). “How long was the child actively distressed?” was also not statistically different for mothers or fathers ( $t(299) = -1.79$ ,  $p = .08$ ). Thus, for both mother and father free play the variables, “How long was the child

somewhat distressed?” and “How long was the child actively distressed?” were added together to create one free play distress variable. The possible range for child distress was 4.00 to 20.00.

The mean duration child distress was 4.32( $SD = 0.70$ ) with a range of 4.00 to 9.00.

The Anger and Irritability scores reported by the mother and father were then correlated with the overall duration child distress variable. Toddler Anger reported by the mother or father was not related to toddler distress. Toddler Irritability, reported by the mother was not significantly related to distress during the free play; however, Irritability reported by the father was modestly correlated with toddler’s distress ( $r = .13, p=.03$ ).

For the clean-up task, a t-test was run to determine whether the frequency of child aversive verbal and physical behavior differed when the task was completed with mothers or fathers. The t-test revealed that mother and father frequency of aversive verbal behavior ( $t(252) = -1.92, p=.06$ ) and frequency of physical aversive behavior ( $t(252) = .12, p=.91$ ) did not statistically differ. Therefore, the frequency of aversive verbal and aversive physical for mothers and fathers were added together to create a score for total frequency of aversive behavior during the clean-up task. The mean aversive behavior score was 8.85( $SD = 10.54$ ) with a range of 0.00 to 64.00. Toddler Irritability and Anger scores reported by mother and fathers were then correlated with the total aversive behavior score. Toddler Anger reported by the mother was significantly related to frequency of child’s aversive behavior ( $r = .27, p<.01$ ). Toddler Anger reported by the father was also modestly related to frequency of the toddler’s aversive behavior ( $r = .19, p<.01$ ). Toddler Irritability reported by the mother or father was not related to frequency of aversive behavior.

For the waiting task, toddler Anger reported by the mother was modestly correlated with the ratio of negative affect ( $r = .12, p=.01$ ). Anger reported by the father was not significantly

correlated with negative affect. Irritability reported by mother and father was not related to negative affect during the waiting task.

## Chapter 4

### Discussion

Although there is increased interest in clinical science regarding irritability as a risk factor during early childhood, there is little information known about irritability, especially during toddlerhood. The first aim of the current study sought to determine whether irritability could be distinguished from toddler anger reactivity in a community sample of toddlers at 27-month-olds using parent-reported questionnaires and interviewer impressions of toddler behavior. As predicted, two separate components had high factor loadings and were labeled Anger and Irritability for mothers and fathers separately. All of the items for each component had a factor score greater than 0.58. The resulting Anger component had seven items for mothers and ten items for fathers, and the Irritability component resulted in six items for mothers and seven items for fathers (Table 1.b,a).

These findings suggest that irritability during toddlerhood is related to, but forms a coherent factor distinct from typical toddler anger reactivity. That is, an irritable child can be described as being angry more frequently per day, easily frustrated, and as having temper tantrums or a hot temper. These items that formed the irritability factor were mostly from the Child Behavior Checklist 1½-5, which is a commonly used instrument for assessing *problem* behavior in young children. Thus, the results of the Aim One analyses suggested the irritability was captured by problematic anger and suggests the potential for irritability to be related to overall level of anger reactivity but to also be unique in its problematic nature. Items on the anger component tended to refer to young children's protesting in situations that would require the child to regulate their frustration such as naptime, not getting dessert, or not getting the toy they wanted. The items that represented toddler irritability, on the other hand, are comparable to

the items found to represent irritability assessed by the Affective Reactivity Index (ARI; Stringaris et al., 2012) administered to older youth. Some items on the ARI, include “lose temper easily,” “often lose temper,” and “stay angry for a long time” and comparable items were found on the Irritability component in the current study such as “temper tantrums or hot temper,” “how many times child gets fussy and irritable per day” and “angry moods.” (Stringaris et al., 2012). Finding a coherent Irritability factor that has related items to a previous measure of adolescent irritability that has been found to be reliable and valid provides initial justification of the irritability factor in the current study.

Investigating irritability and anger reactivity during toddlerhood is challenging because anger reactivity is common during early childhood and misbehaviors during this time are seen as normative (Campbell, Shaw, & Gilliom, 2000). However, recent evidence indicates that temper tantrums can differ in form in ways that are clinically meaningful and a group of preschoolers have temper tantrums that are more frequent and occur in situations that are unpredictable (Wakschlag et al., 2012). The current study adds to this literature by determining that irritability is distinguishable from typical anger during toddlerhood and there is potentially a group of toddlers with higher levels of irritability. In the current sample, most toddlers were not irritable; for mothers’ report, the mean Irritability score was 1.77 ( $SD = 0.40$ , range = 1.00-3.50) and for fathers’ report, the mean score was 1.59 ( $SD = 0.37$ , range = 1.00-3.43). However, there was a small group of toddlers (2.4% for mothers’ report and 2.3% for fathers’ report) that had a total irritability score greater than 2.57. This small group of highly irritable toddlers potentially could be at risk for later psychopathology. This preliminary investigation emphasizes the need for future research to investigate whether there is a group of toddlers with clinically concerning irritability. Furthermore, a valid and reliable measure of toddler irritability has promise for enhancing the ability to detect mental health risk early in a child’s development for improving

prediction of pathways to later psychopathology. The parents of irritable children may then be targets for parenting interventions for at-risk dyads in which both parent and young child self-regulation of anger and frustration can be addressed.

The second aim of this study was to determine whether the irritability component systematically related to independent observations of toddler behavior in different situational contexts that varied in the level of anger they typically elicit. To my knowledge this was the first investigation of irritability as it relates to concurrent observations of behaviors. We predicted that toddler Irritability would be related to the frequency of toddler frustration in free play (typically does not elicit frustration), clean-up (typically elicits frustration in some children), and waiting (typically elicits frustration in most children). Based on the prior literature, it was expected that children who scored higher on parent-reported irritability would show more enduring and frequent angry distress in these tasks. Specifically, we predicted that toddler irritability would be positively related to: duration of child distress during the free play task, frequency of aversive behavior during the clean-up task, and number of intervals of negative affect during the waiting task.

Overall, analyses indicated that toddler irritability was not related to the child's behavior during the observational tasks, with the exception of father reports of toddler irritability, which was modestly correlated with the duration of child distress during the free play task. Although free play does not involve blocking children's goals and does not typically elicit frustration in young children, this finding suggests partial support of the uniqueness of the irritability factor. According to Stringaris and colleagues (2012), irritability includes angry distress that is unpredictable; angry distress in a task that is generally pleasing is not predictable. Previous research has also indicated that a more enjoyable task may be indicative of pervasive and persistent behavior problems (Keenan & Wakschlag, 2000). The finding that father irritability

related to the free play task suggests that an enjoyable task, such as the free play, may help to distinguish those toddlers who have clinical irritability from those toddlers with typical anger reactivity. Exploring the behaviors that irritable toddlers present in typically enjoyable tasks is warranted.

However, toddler irritability was not related to any of the other indices taken from observations of toddlers, limiting the extent to which it is possible to assume that irritability was distinguished in this study. The lack of findings may be due, at least in part, to study design issues. For example, most of the tasks are very brief; clean-up is usually just a few minutes. If the tasks employed were longer, irritable toddlers may have eventually become distressed and distinguished themselves from typical toddlers. Future research should include a range of tasks that are long enough and for which there is evidence of individual differences in the number of children who become distressed (Keenan & Wakschlag, 2000; Kochanska, & Aksan, 1995).

Although adopted children are, as a group, at greater risk for behavior problems (Brand, & Brinich, 1999), there was no guarantee that the sample would include a sufficiently large number of irritable toddlers. In fact, most of the toddlers did not have high levels of irritability. Future research aimed at identifying anger-related risk in toddlers may benefit from recruiting samples with greater likelihood of identifying a sub-group of irritable toddlers. For instance, recent research has found that irritability may be influenced by genetic factors (Leibenluft, 2011; Stringaris et al., 2014). Thus, it may be best to target parents with high levels of irritability and their children because there is a greater likelihood of identifying a group of toddlers with clinical levels of irritability.

Investigation of the Anger component found that Anger, reported by mothers and fathers, were positively related to the frequency of aversive behavior during the clean-up task. Toddler Anger score reported by the mothers was also slightly positively correlated with the ratio of

intervals coded for child negative affect during the waiting activity. The relationship between the Anger component and the observational data confirm the parent-reports of their toddler's anger. The relationship between the child anger and child aversive behavior during the clean-up indicates that a clean-up task may be capturing typical toddler anger rather than irritability. We would expect that a toddler would be frustrated in a situation where they are first playing with their parent and then told that they must comply with their caregivers requests to clean-up. An irritable toddler we would expect to get angry in this type of situation and there may be a group of irritable toddlers who do get angry in a clean-up task, however, that was not captured in the current study. Another possibility is that there are irritable toddlers with more intense levels of anger compared to toddlers with typical anger; however we were limited to frequency of child aversive behavior because there was no measure of child intensity of aversive behavior. Finally, the measure of child aversive behavior itself was a limitation because the variable included a lot of behaviors that ranged from kicking the parent to hitting a toy. This wide range of behaviors limits the interpretation of the results. Future research should use measures that capture more aspects of toddler's anger such as intensity, frequency, duration, and latency.

The study's strengths include using parent reported questionnaires from both mothers and fathers in addition to having a large sample size that is likely to include at risk children. However, the study did have limitations. One weakness is the range of toddler age, which was 23.75–44.71 months. This large range may affect how the irritability component related to anger in the observational tasks because there are behavioral difference between 23-month-olds and 44-month-olds. A preschool age child may already have some skill at tolerating frustration and regulating anger in frustrating situations. For example, when expected to wait, 36-month-olds are angry for less time and engage in more strategies for regulating frustration, such as distracting themselves, compared to their behavior at age 24 months when they are angry longer

and engage in less distractions (Cole et al., 2011). Compared to toddlers, a preschooler has more experiences with frustrating situations to draw from, which afforded more opportunities for parents to intervene and teach emotion regulation. Future research should use large samples of children drawn from each age point to determine any predictive utility of irritability at different time points. The cross-sectional nature of this investigation also limits the ability to determine how irritable children's anger changes overtime.

Another limitation and possible reason why the irritability component did not relate to observational behavior of the children is the tasks themselves. The current study was limited to selected observational tasks from the large number of procedures as part of the EGDS project. The measures of toddler anger during the tasks varied significantly; the free play task had a measure of child distress, the clean-up task had a measure of aversive behavior, and the waiting task had a measure of negative affect. The different measures limited the interpretations because they are not measuring toddler anger consistently between tasks. To address this limitation, future research should use tasks designed to measure different elements of anger. We would expect an irritable toddler to present anger that is more intense, less predictable, and more frequent, thus, the tasks would measure the intensity, latency, and frequency of anger overtime. Therefore, future research should focus on situations that require toddlers to regulate their frustration to determine whether irritability is related to observations of the toddler's behavior.

In conclusion, this study adds to the literature on irritability by determining that irritability during toddlerhood coheres as a unique factor that is distinct from typical toddler anger reactivity. However, future research should look into the relationship between irritability and the child's behavior during observational tasks to understand the differences between toddler anger reactivity and irritability. Future research should also examine how irritability develops

over time throughout toddlerhood, and whether irritability identified during toddlerhood is predictive of future behavior in observational contexts and future symptoms or psychopathology.

## Tables

Table 1.a *Questionnaire data: Anger scale means, standard deviations, actual and possible ranges, and factor scores*

	Mean ( <i>SD</i> )	Possible and Actual Range	Factor Score	
			Anger	Irritability
<b>Mother</b> <i>n</i> = 132				
Protest not going outside by crying loudly	3.65 (1.61)	1.00 – 7.00	0.63	0.25
Struggle when separated from toy	3.10 (1.61)	1.00 – 7.00	0.63	0.16
Scream when removed something from him/her	3.84 (1.54)	1.00 – 7.00	0.68	0.27
Protest for dessert by crying loudly	3.10 (1.76)	1.00 – 7.00	0.61	0.14
Protest not getting toy in a whining tone of voice	3.21 (1.62)	1.00 – 7.00	0.59	0.26
Protest nap by crying loudly	3.19 (1.63)	1.00 – 7.00	0.65	0.06
Protest nap by physically resisting or struggling	3.08 (1.64)	1.00 – 7.00	0.64	0.03
<b>Father</b> <i>n</i> = 121				
Protest not going outside by crying loudly	3.39 (1.48)	1.00 – 7.00	0.71	0.42
Struggle when separated from toy	2.82 (1.28)	1.00 – 7.00	0.68	0.18
Scream when removed something from him/her	3.64 (1.44)	1.00 – 7.00	0.67	0.47
Protest for dessert by crying loudly	2.89 (1.53)	1.00 – 7.00	0.66	0.42
Protesting not getting toy in a whining tone of voice	3.07 (1.38)	1.00 – 7.00	0.62	0.28
Protest nap by crying loudly	3.31 (1.54)	1.00 – 7.00	0.68	0.33
Protest nap by physically resist or struggle	3.06 (1.45)	1.00 – 7.00	0.58	0.26
Showed anger because he or she wanted to do it	3.94 (1.47)	1.00 – 7.00	0.61	0.26
Protest not going outside in a whining tone of voice	3.64 (1.39)	1.00 – 7.00	0.61	0.36
Reversed follow request without anger when toy removed	4.26 (1.35)	1.00 – 7.00	0.58	0.36

*Note.* Possible and actual ranges did not differ.

Table 1.b *Questionnaire data: Irritability scale means, standard deviations, actual and possible ranges, and factor scores*

	Mean (SD)	Possible and Actual Ranges	Factor Score	
			Anger	Irritability
<b>Mother</b> <i>n</i> = 132				
How many times child get fussy and irritable per day	2.85 (0.98)	1.00 – 7.00	0.19	0.63
Easily frustrated	1.62 (0.59)	1.00 – 3.00	0.09	0.73
Angry moods	1.32 (0.48)	1.00 – 3.00	0.13	0.69
Stubborn, sullen or irritable	1.38 (0.51)	1.00 – 3.00	0.28	0.58
Temper tantrums or hot temper	1.67 (0.58)	1.00 – 3.00	0.28	0.64
Whining	1.73 (0.53)	1.00 – 3.00	0.24	0.65
<b>Father</b> <i>n</i> = 121				
How many times child get fussy and irritable per day	2.79 (0.96)	1.00 – 7.00	0.33	0.62
Easily frustrated	1.56 (0.58)	1.00 – 3.00	0.27	0.66
Angry moods	1.29 (0.49)	1.00 – 3.00	0.43	0.65
Stubborn, sullen, or irritable	1.34 (0.50)	1.00 – 3.00	0.29	0.73
Tamper tantrums or hot temper	1.51 (0.57)	1.00 – 3.00	0.43	0.66
Whining	1.61 (0.57)	1.00 – 3.00	0.28	0.63
Sulks a lot	1.02 (0.15)	1.00 – 3.00	0.17	0.65

*Note.* Possible and actual ranges did not differ.

Table 2.a *Observational data: Free Play means, standard deviations, actual and possible ranges*

<b>Mother</b>	Mean (SD)	Actual Range	Possible Range
How long was the child somewhat distressed?	1.11 (0.33)	1.00 – 3.00	1.00 – 5.00
How long was the child actively distressed?	1.01 (0.14)	1.00 – 3.00	1.00 – 5.00
<b>Father</b>			
How long was the child somewhat distressed?	1.16 (0.38)	1.00 – 3.00	1.00 – 5.00
How long was the child actively distressed?	1.05 (0.30)	1.00 – 4.00	1.00 – 5.00

Table 2.b *Observational data: Clean up means, standard deviations, actual and possible ranges*

<b>Child to Mother</b>	Mean (SD)	Actual Range
Frequency aversive verbal	3.89 (6.00)	0.00 – 2.00
Frequency aversive physical	0.25 (1.50)	0.00 – 21.00
<b>Child to Father</b>		
Frequency aversive verbal	4.49 (6.17)	0.00 – 31.00
Frequency aversive physical	0.25 (0.91)	0.00 – 11.00

Table 2.c *Observational data: Waiting task means, standard deviations, actual and possible ranges*

	Mean (SD)	Actual Range
Child affect coded intervals	29.80 (0.99)	20.00 – 30.00
Ratio of intervals coded as negative	0.16 (0.25)	0.00 – 1.00

Table 3 *Spearman's rho correlations between Irritability, Anger and observational variables*

	1	2	3	4
<b>Mother</b>				
1. Anger	—			
2. Irritability	0.35**	—		
<b>Father</b>				
3. Anger	0.40**	0.22**	—	
4. Irritability	0.20**	0.40**	0.43**	—
<b>Free Play</b>				
5. Duration of child distress	-0.02	0.00	0.06	0.13*
<b>Clean-up</b>				
6. Frequency of aversive behavior	0.27**	0.10	0.20**	0.06
<b>Waiting task</b>				
7. Ratio of intervals of negative affect	0.12*	0.06	-0.01	0.03

Notes. \* p<.05 \*\* p<.01

## TODDLER IRRITABILITY

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### Education

Schreyer Honors College at The Pennsylvania State University May 2015  
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### Scholarship & Awards

Dean's List	Fall 2011-Fall 2014
Liberal Arts Superior Academic Achievement Award	Fall 2012-Fall 2014
Sue Paterno Renaissance Scholarship	Fall 2012 - Spring 2015
Runtagh Scholarship	Fall 2013 - Spring 2014
Biggar Trustee Scholarship	Fall 2012-2013
Weston Memorial Trustee Scholarship	Fall 2011-Spring 2012
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### Research Experience

Development of Emotion Regulation Laboratory, University Park, PA Oct. 2012-Present  
Title: Undergraduate Research Assistant  
Supervisor: Dr. Pamela Cole  
Description: Honors Thesis – Toddler Irritability Project: Developing an irritability scale and determining whether toddler irritability is distinct from typical toddler anger reactivity. Attend weekly lab meetings to discuss literature on emotion development and regulation.

School-Based Prevention Research Laboratory, University Park, PA Sept. 2013-May 2014  
Title: Undergraduate Research Assistant  
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### Relevant Experience

Hort Woods Child Care Center, University Park, PA Aug. 2014-Present  
Title: Classroom Aide  
Supervisor: Wendy Whitesell  
Description: Assist teachers with managing child behavior. Plan and facilitate developmentally appropriate activities.

Bellefonte Area Elementary School, Bellefonte, PA Aug. 2014-Dec. 2014  
Title: Reading Interventionist  
Supervisor: Dr. Peter Nelson  
Description: Implemented DIBELS Oral Reading Fluency and Retell Fluency, Repeated Reading, and Guided Reading for an at-risk 4<sup>th</sup> grade student.

Camp STAR, Summer Treatment Program, Highland Park, IL June 2014-Aug. 2014  
Title: Recreational Counselor and Bus Counselor  
Supervisor: Dr. Andrea Chronis-Tuscano  
Description: Implemented the evidence-based behavior modification treatment program (point system, individualized treatment program, physical management, problem solving procedures, etc.) Created and instructed recreational activities and instructed games for children with attention deficit hyperactivity disorder. Supervised bus ride for 1.5 hours to and from camp.

Easter Seals Child Development Center, State College, PA January 2014-May 2014  
Title: Personal Care Aide  
Supervisor: Brandy Prebble  
Description: Worked one on one to improve emotion regulation skills for a four-year-old with behavior problems.

Child Study Center – Friendship Group, University Park, PA Sept. 2013-May 2014  
Title: Coach  
Supervisor: Dr. Janet Welsh  
Description: Led weekly sessions based on evidenced based practices to assist children who struggle with social interactions.

## Presentations

LaRose A., Toddler Irritability as Distinct from Typical Toddler Anger Reactivity. Poster presented at: Psi Chi Research Conference; 2015 April; University Park, PA.

LaRose A., Toddler Irritability as Distinct from Typical Toddler Anger Reactivity. Poster presented at: Undergraduate Exhibition; 2015 April; University Park, PA.

LaRose A., McTiernan E., Moore W., Pawlo E. Attitudes Toward Stay-At-Home-Dads. Poster presented at: Undergraduate Exhibition; 2014 April; University Park, PA.

*Second Place: Social and Behavioral Sciences*

LaRose A., McTiernan E., Moore W., Pawlo E. Attitudes Toward Stay-At-Home-Dads. Poster presented at: Psi Chi Research Conference; 2014 April; University Park, PA.

## Related Coursework

- Psychology as a Science and Profession
- Introductory to Abnormal Psychology
- Abnormal Psychology
- Introduction to Cognitive Psychology
- Introduction to Developmental Psychology

- Introduction to Social Psychology
- Honors Basic Research Methods in Psychology
- Introduction to Clinical Psychology
- Mental Health Practicum with Children
- Senior Seminar: Emotion Regulation
- Graduate Course: Professional Issues in School Psychology
- Reading Intervention Practicum
- Research Project in Psychology
- Senior Honors Thesis Writing in Psychology
- Introduction to Human Development and Family Studies
- Infant and Child Development
- Family Development
- Observation with Children, Youth, and Families
- Experience with Children, Youth, and Families
- Values and Ethics in Human Development Professions
- Elementary Statistics
- Introductory Statistics

### Other Coursework

- Human Body: Form and Function
- Physiology
- Introduction to Biobehavioral Health
- Foundations and Principles of Health Promotion
- Genetics and Evolution of the Human Species
- Biology: Basic Concepts and Biodiversity
- Writing in the Social Sciences
- Honors: The History of Madness, Mental Illness, and Psychiatry
- Intermediate Spanish