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EMOTION REGULATORY STRATEGIES IN YOUNG CHILDREN:  
A FUNCTIONAL PERSPECTIVE OF NEGATIVE EMOTIONS  
IN A FRUSTRATING TASK

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## Abstract

Emotion regulation is a topic that has received much attention in the literature in recent decades, but gaps still exist in the literature. Particularly, the toddler population is relatively unstudied. The present research helps fill gaps in the research by looking at 114 typically developing 36-month-old children during a frustrating task, the Transparent Box task. According to a functional theory of emotions, the children's emotions will likely predict the strategies they use to cope with the situation. Children who display anger will be more likely to pursue the goal of the task, while children who display sadness will be more likely to relinquish the goal. Furthermore, at high-intensity anger levels, this effect is likely to diminish. Results provided partial support for this theory, and implications for future research are examined.

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Emotion regulation has been defined in the literature as the changes that result from an emotional state, including changes in both the emotion itself as well as the psychological functions associated with it (Cole, Martin, & Dennis, 2004). Emotion regulation is a topic that has become increasingly popular in the past decade (Buss & Goldsmith, 1998; Grolnick, Kurowski, McMenemy, Rivkin, & Bridges, 1998; Eisenberg, Spinrad, Fabes, Reiser, Cumberland, Shepard, Valiente, Losoya, Guthrie, & Thompson, 2004). This is because the development of such a skill beginning in infancy and continuing throughout childhood is a vital skill in order for the child to perform optimally in both cognitive and social situations (Grolnick et al., 1998). Additionally, the development of emotion regulation is multifaceted, affecting everything from attachment to psychopathology (Buss & Goldsmith, 1998). Particularly in preschool aged children, the development of emotion regulation has been linked in the research to a number of factors of the child's social domain. These factors have included competence, popularity, and inhibition in social situations (Carlson & Wang, 2007). It is apparent that the ability for children to be able to control their emotions is a crucial element to the optimal development in a large variety of areas.

When analyzing emotion regulation, two aspects are particularly important – both emotion expression and regulatory strategy. Being that the emotion component is such a vital part of emotion regulation, in any construct of emotion regulation it is imperative that emotion is examined. Though there is currently no standard definition for the construct of emotion (Cole, Martin, & Dennis, 2004), one of the most typical ways that studies undergo examination of emotion regulation is by observing nonverbal communicative behavior, i.e. emotion expression. By looking at observable nonverbal signals of a specific emotion—through facial action, vocal tone, and gestural and postural cues, we can get an idea of the emotional state of the child (e.g.,

Malatesta, Culver, Tesman, Shepard, Fogel, Reimers, & Zivin, 1989). Beyond the emotional component to emotional regulation, behaviors that are believed to help a child regulate emotion—regulatory strategies—can also be examined. It can be assessed whether children use specific strategies, if they are appropriate to the situation, and if they are effective in modifying emotional intensity or duration. Strategies are any behavior that a child executes that serves as a regulatory mechanism for changing the emotion; common strategies among young children participating in emotion-eliciting laboratory tasks are distraction, focusing on achieving a goal, or seeking social support from adults (Buss & Goldsmith, 1998).

Much research has been devoted to each aspect of emotion regulation, particularly in regard to negative emotions and how they are regulated. There has also been some research on how negative emotions affect other psychological functions. To start, physiological functions are altered by negative emotion expression. As early as infancy, cortisol levels, which indicate stress, increase when infants are sad, and heart rate increases for both sadness and anger (Lewis, Ramsay, & Sullivan, 2006). Beyond physiological functioning, Lengua, West, & Sandler (1998) illustrate a significant link between children's negative emotionality and clinical symptoms of psychopathology, including both internalizing and externalizing problems. Furthermore, negative emotion expression has been linked to non-clinical social problems, including negative evaluations of child behavior by both teachers and peers (Denham, Blair, Schmidt, & DeMulder, 2002). The latter study is one of the few to examine how children's negative emotion influences their regulatory behavior. These negative social perceptions of the child were most related to whether or not the child regulated negative emotions – particularly anger - properly.

The empirical study of regulatory strategies is vital because as early as infancy they are shown to be important in maintaining and regulating negative emotions. For example, Stifter &

Braungart (1995) examined five- and 10-month-old infants in a distressing task, observing how infant regulatory strategies, such as self-soothing and averting gaze away from the source of distress, alleviated their negative emotions. They showed that these behaviors reduced the intensity of infant distress, providing evidence that the behaviors were strategic in modulating negative emotion. Repeatedly research has been consistent with the finding that regulatory mechanisms like strategies can have an effect on the emotional reactivity of even very young children, although the effectiveness of these strategies in early childhood is quite limited (Buss & Goldsmith, 1998).

Although there is this small body of research showing how strategic behaviors affect negative emotions in young children, there is very little research showing how negative emotion affects which strategic behaviors children attempt. One study, however, has shown a relation between the strategy employed by a preschool age child and the emotional expression associated with that strategy, specifically anger and sadness. Dennis & Kelemen (2009) considered three different types of strategies and the way children consider their effectiveness in changing their emotion during a frustrating task. The types of strategies were behavioral distraction (the child opts to change activity), cognitive distraction (the child opts to think about something else), and repair (the child opts to try to fix the problem). They related these strategies to three emotions—anger, sadness, and fear. Children then indicated how effective the strategies would be at reducing the negative emotions of anger, sadness, and fear through a puppet procedure – where children were instructed to recommend the best course of action for puppets in various emotionally eliciting situations. The results indicated that children as young as three denoted the belief that behavioral distraction was more associated with reducing sadness and repair would be a better strategy to reduce anger. If children are likely to endorse specific strategies at this young

age, it seems plausible that they will, in turn, use the same strategies they would endorse in order to control their own emotions in a given situation.

In order to put this idea to the test, Dennis, Cole, Wiggins, Cohen, & Zalewski (2009) looked at three and four year old children in two different frustration tasks in order to assess the way in which the strategies children use related to the emotions they expressed. The waiting task frustrates a child by making the child delay gratification, i.e. wait to open a gift. In this procedure, the child was told by mother to wait to open a wrapped present while the mother completed work that she had to do. The only other play object in the room was a broken toy. The child was observed in this situation for eight minutes. The second task, the transparent box task, elicited frustration in a different manner. In this task, the child selects a desired toy and the research assistant has the child place it in a clear, acrylic box and then shows the child how to lock and unlock the box with a set of keys. The assistant then prepares to leave the room but gives the child the wrong set of keys. Whereas the child is with mother in the wait task, the child is alone in the transparent box task.

Dennis et al. (2009) set out to explore both the strategies that related to emotion expression, but also the range of behaviors that are associated with each emotion expression by observing the relations within 15-second epoch levels. In particular, they found that in the transparent box task, anger was more associated with children's efforts to solve the problem, focusing on the task demands, and distracting attention from the box, more than sadness was. This evidence provided partial support for the functional theory of emotion in that the tendency to act strategically in the situation was related to anger but not sadness, but the idea that sadness would be related to a specific type of strategy was not found. Nonetheless, this study is a good starting point to begin testing this theory in young children. One limitation of the Dennis et al.



(2009) study; however, was that unique relations may have been overlooked because of the long time units they used—15 seconds. It was not possible for them to know the temporal nature of the relations. A strategic behavior could have occurred *before* an emotion expression of anger or sadness, for example. It is therefore important to further the study of the relation between specific strategies – such as behavioral distraction and repair – and to determine if improved design of the research yields predicted relations between child emotion expression and *subsequent* strategy use.

Despite the wealth of information about emotion regulation that has developed over the past decade, gaps still exist and need to begin being targeted in the research. One of the problems within the current research is the lack of information about the population of toddlers. While there is a multitude of studies have looked at emotion regulation in infancy (Stifter & Braungart, 1995; Buss & Goldsmith, 1998), school-age children (Rossman, 1992; Southam-Gerow & Kendall, 2002), and adolescents (Eschenbeck, Kohlmann, & Lohaus, 2007; Shipman, Zeman, & Stegall, 2001) there appears to be a significant lack of information that looks at the emotions and behaviors of this particular population in frustrating situations (Dennis et al., 2009). Another problem is that many studies look at tasks of emotion regulation that involves another person – either the mother or a research assistant - being present in the room. While it is important to examine the role of this influence on the child’s emotion regulation, it has been demonstrated in the research that there are differences in how the child reacts with a parent in the room with them. Namely, the child is more likely to act in socially appropriate ways because of the mother’s presence in a room during a task (Grolnick et al., 1998). Finally, when studies such as Dennis et al. (2009) do examine if relationships between emotion and strategy do exist, the time-

lapse that is examined between the two observations are usually very large – for example, in epochs of ten to fifteen seconds.

To combat the problems and gaps within the current body of research, the present study aims to target a specific range of goals. By studying a group of 36 month old children, an addition to the body of literature on emotion regulation will be achieved, especially for a population with such a dearth of information. Furthermore, the present study differentiates between anger and sadness, so that a better glimpse of negative emotion and its implication on emotion regulatory strategy can be achieved. Moreover, this study aims at looking at the intensity of such emotion and how it relates to whether or not the strategy occurs. This is another important area of research that is understudied. The importance is due to the effects of the intensity of emotion: while more severe and under-regulated anger tends to lead to more externalizing problems and lower effortful control, this is not as severe of an impact when the anger is milder or well-regulated (Eisenberg et al., 2004). As in the Dennis et al. (2009) study, anger in a frustrating task actually elicited behaviors that were socially appropriate and helpful in the situation, specifically, attempting to achieve the goal. Therefore, anger at low levels should be more linked to persisting at solving a problem, whereas more intense anger, which is known to be associated with problematic behavior, should diminish the likelihood of socially appropriate behavior and the positive effects of anger.

Other ways in which the present study aims to fill the gaps in the body of literature is that the current study involves observations of the child alone, without the mother being present in the room, which allows a more direct assessment of child self-regulation. Most young children will turn to a trusted adult in a distressing situation; it is when they are alone that we can observe what they are able to self-generate as a method of self-regulation. Moreover, when the mother is

present, a child may be more likely to engage in socially appropriate behavior because an adult is present. Therefore, observing children when they are alone allows for examination whether their behavior deteriorates (becomes inappropriate) and whether their behavior reflects efforts to self-regulate. Finally, the current study takes a new approach to examining the relations between emotion regulatory strategy and emotion expression by examining them in a highly fine-grained manner, at a second-by-second level. This approach permits assessment of subtle elements of emotion expressions and their relation in time to regulatory strategies that occur within a given task so that all relations can be understood and studied.

The present study addressed two central questions: 1) do relations exist between the child's expression of anger or sadness, and the type of strategy the child attempts, specifically does anger predict trying to solve a problem and sadness predict stopping the effort to solve the problem?; and 2) if a relation is found, does the intensity of the emotion expression predict the likelihood of the behavior? According to functional emotion theory, anger should predict different strategies than sadness does. Campos, Campos, & Barrett (1989) wrote in their paper on the function of emotion that sadness indicates readiness to forgo achievement of a goal, whereas anger indicates readiness to achieve the goal despite the obstacles. Therefore, this study hypothesizes that when 36-month-olds express anger, they will be more likely to pursue the goal in a frustrating task (or engage in a problem solving strategy), whereas when they display sadness, they will be more likely to relinquish the goal (or engage in a distraction strategy). However, this relation may depend on the intensity of the child's emotion. Poorly regulated anger or sadness is less likely to lead to any appropriate strategy. Therefore, the prediction is that high intensity of negative emotion interferes with appropriate pursuit of the goal or relinquishment of the goal.

## Method

### *Participants*

Participants in this study were 114 typically developing children, 62 boys and 52 girls. The full sample included 120 children but several children missed the 36-month-lab visit or the procedure used in this study. The children's families were a part of a larger, longitudinal project that began when the children were 18 months old and ended when they were 5 years old. Throughout the project, children were visited in their homes and in the laboratory. For the current research project, children were observed in the laboratory at 36 months old (M age in months = 35.67, SD = .85). At the start of the study, 94% of the children had been identified as Caucasian, and 5.8% as being from an ethnic minority (including African American, Hispanic, and Asian). In addition, families were recruited from rural and semi-rural communities in central Pennsylvania.

In order to be included in the larger study, families also had to meet certain inclusion criteria. First, family income was restricted to households that were economically strained. For the larger study, an economically strained household was defined by household income level being above the poverty level that is set by the federal government and below the national median income level for the family's size. This criterion was not standard for the present study, as two of the families fell above the income limits in the present study. Second, children had to be 18 months old at the first visit (SD = 2 weeks). Third, the child had to have lived with the primary caregiver from at least three months of age. Finally, the child could not have a condition that would interfere with the ability to participate in the laboratory procedures, such as blindness.

Families were recruited through a multi-step process. First, researchers used U.S. census data to identify communities that contained a large percentage of families with young children

that met the income criteria of the study. Next, further research was done to look into these communities in order to gain familiarity with them. After this, researchers contacted community leaders in medicine, education, politics, and religion in order to understand the communities further and to familiarize community leaders with the research study. When all necessary information of the communities was gained, undergraduate research assistants searched through published birth records in order to find and contact eligible families. From this research, letters were sent to the homes of potential participating families. Researchers also recruited participants by going to community events and putting up fliers in daycare and preschool centers. Interested families were given additional information about the study over a phone interview, in which they were also determined as to whether or not they met the eligibility requirements. If they were, a second demographic-based phone interview was made and the family was signed up for their first visit.

There are other notable characteristics of the families participating in this study. At 18 months, 19% (n = 23) of mothers had only finished high school, 15.7% (n = 19) of mothers had attended vocational school, and 63% (n = 76) of mothers had taken some college courses. 28% (n = 34) of mothers described themselves as unemployed or homemakers, 32% (n = 39) worked part time, and 39% (n = 47) worked full-time. Also at 18 months, the average annual household income was \$40,655.70 (SD = 14,996.57). The average annual household income per capita at 18 months was \$11,009.49 (SD = 4,534.17). Finally, of the children participating in the study, 45% (n = 54) were the first-born, 38% (n = 45) were the second-born, 12% (n = 15) were the third-born, and 5% (n = 6) were the fourth- or later-born in their family structures.

As mentioned previously, these families were part of a larger longitudinal study that began when the child was 18 months and ended when the child was 5 years old. Four visits were

conducted in the child's home and five visits were conducted in the laboratory at the Child Study Center at the Pennsylvania State University. The current study uses data drawn from the laboratory visits when the child was 36 months old. The laboratory visits included standardized intelligence testing, language testing, and naturalistic observation of children in a variety of tasks, ranging from non-frustrating/challenging to frustration-inducing activities. Only the procedure that was used for the present study is described.

### *Procedure*

Emotion expression and regulatory strategy were observed using the Attractive Toy in Transparent Box task, a standard task used to elicit anger (Goldsmith & Rothbart, 1996). The task began with the research assistant asking the child to choose the toy the child likes best from an assortment. Once the child chose a toy, the research assistant put the toy in a transparent box and locked the box with a padlock. The research assistant then taught the child to open the box with a key, showing them how to insert the key, turn it, and pull down the lock to open it and the box. After insuring the child understood the instructions, the research assistant left the child alone in the room for 2½ minutes with the wrong set of keys. When the research assistant returned, the child was asked questions about how it felt be unable to open the box and why the box would not open. The research assistant then informed the child that a mistake was made and the child was given the wrong keys. When the child opened the box with the correct key, he or she was allowed to play with the toy for a small amount of time and then take the toy home after the lab visit. Children were video recorded from behind a two-sided mirror so that research assistants could code emotion expression and strategy use after the visit.

## *Measures*

In order to gather data for the Attractive Toy in the Transparent Box Activity, two independent coding teams classified child behaviors – one team for emotion expression, and one team for strategy use. The variables used for the present study were taken from these two coding systems, described next.

### Second-by-Second Emotion Coding

One team was trained to code the emotion expression of the children for each second of the task. The specific emotions this team was trained to recognize and code were sadness, anger, happiness, and anxiety. Specifically, the coding team was trained to code emotion of the child based on non-verbal behaviors, including facial, vocal, gestural, and postural information. Sadness expression was defined by any of the following: turned corners of lips, pouting, drooped eyes, an oblique brow, low voice volume without intending to whisper, voice dropping off and the end of speech, head dropping down and to the side, shoulders and body slumping, and eye rubbing. Anger expression was defined by any of the following: furrowed brow, narrowed eyes, clenched jaw, pressed lips, squared off mouth, harsh vocal quality with loud pitch, and arms akimbo with fingers either jabbing or wagging. Happiness and anxiety were not included in the present study.

In addition to coding the presence of a certain emotion in a given second, emotion coders also coded the intensity of the expressed emotion on a scale from 1-3. A score of 1, or mild emotion, was defined by an emotion expression that was faint and minimal. Examples of this would be a slight dropping of the head to the side. A score of 2, or moderate emotion, was indicated by clear expressions, with more than one cue of the emotion likely present. For example, an anger expression with an intensity score of 2 could be defined by clearly pressed

lips and a furrowed brow. Finally, a score of 3, or high emotion, was designated by clear, unambiguous, full emotion expressions. Scores of 3 for the emotion of sadness could be identified by a turned down mouth, a slumped posture, and a whimpering cry. The coders were trained to 85% accuracy with a master coder. Once accuracy was achieved, each person coded individual cases independently. Approximately 10% of the cases were double-coded, without the coders' knowledge, to ensure that reliability was maintained. Throughout the coding process, coders maintained 85% reliability.

### Second-by-Second Strategy Coding

A second coding team was trained to observe strategies the child employed on a second-by-second level. The different strategies that were coded for this task were: bids to the mother or research assistant, self-soothing, verbalization, attempt to fix, attempt to fix - alternative, distraction, and focus on the demand. This study in particular looks at the strategies of attempt to fix, attempt to fix – alternative, and distraction. Attempt to fix was defined simply as when the child attempted to open the box in the way he or she was instructed to do – putting the key in the lock and trying to turn it to open it. Attempt to fix – alternative, then, was defined as the child attempting to open the box in any other way other than the way he was showed. Examples include trying to pull down the lock without having unlocked it, trying to wedge the key in the box, and trying to throw the box on the ground. Distraction was defined in two ways – a brief distraction and a focused distraction. Brief distraction was defined typically as less organized and/or briefer than focused distraction, which was intentional and typically lasted longer amounts of time. Either of the types of distractions included jingling the keys, walking around the room, or looking at the posters in the room. The strategy coding team established 85% reliability through training, and once trained began independently coding. This team also had



random reliability checks without their knowledge in order to ensure reliability. Throughout the coding process, coders maintained 78% reliability, with approximately 15% of tapes providing reliability checks.

### Variables in the Present Study

To test the hypotheses of the current study, the emotion expressions of anger and sadness, and the strategies “attempt to fix” (i.e., instrumental problem-solving behavior) and distraction (i.e., attention shifting away from the source of distress), were used to create variables. Both attempt to fix and attempt to fix – alternative were included in the overarching “fix” strategy. Likewise, both brief and focused distractions were included in the overall “distract” strategy. In addition, for the emotion coding of anger and sadness, intensity of the expression was taken into account. Lagged variables were created so that the strategy that occurred was counted in the one second following the emotion expression. The resulting variables were: no regulatory behavior observed, fix, distract, other regulatory behavior, no anger or sadness, mild anger (intensity = 1), mild sadness (intensity = 1), and high intensity anger and sadness (anger + sad with intensities > 1).

### Results

Table 1 presents the means, standard deviations, ranges, sums, and percentages relative to all behaviors for each emotion and strategy observed in the present study. The top portion of the table refers to only the variables of the emotion or the strategy (anger, sadness, attempt to fix, and distraction all separate from one another). The bottom part of Table 1 refers to the variables of the emotion or the strategy as they are in relation to each other – in one-second lag relations. The results showed that there was a relation between the types of negative emotion expression a

child displayed and the regulatory strategy the child used in the following second using the Crosstabs procedure (SPSS 18.0) and the Pearson  $X^2$  statistical test.

A significant effect was shown, as predicted, there were nonrandom relations between emotion expression and strategic behavior,  $X^2 = 981.266$ ,  $df = 9$ ,  $p = .0005$ ). The strategy “attempt to fix” was more likely to occur in the second following low-intensity anger expression than would be expected by chance (expected count = 406, actual count = 353.4). Moreover, also as predicted, when emotion expression was more than mild in intensity, the fix strategy was less likely to occur than would be expected by chance (expected count = 354.4, actual count = 107).

In terms of sadness, relations were also found although these were not entirely as expected,  $X^2 = 981.266$ ,  $df = 9$ ,  $p = .0005$ . As predicted, distraction was more likely to occur in the one second following mild sadness expressions than would be expected by chance (expected count = 80, actual count = 96) and less likely to occur in the second following an expression of mild anger (expected count = 84.1, actual count = 48). That is, distraction was twice as likely to occur following sadness as it was following anger. Moreover, attempt to fix was less likely following sadness than would be expected by chance (expected count = 336.3, actual count was 212). However, mild sadness was more likely than expected by chance to be followed by either no regulatory behavior (expected count = 26.9, actual count = 59) or any of the other regulatory strategies that were not the focus of the study (expected count = 147.6, actual count = 224). So although sadness more than anger was related to distraction, sadness was also related to a range of other regulatory behaviors.

In addition to the predicted findings, additional results were revealed that are noteworthy. These include the likelihood of strategies to occur when the child is not expressing anger or sadness prior to the use of a strategy ( $X^2 = 981.266$ ,  $df = 9$ ,  $p = .0005$ ). For attempting to fix, the

expected count that the strategy will occur following no anger or sadness expression is 8078.8 but it actually occurs at a somewhat higher frequency (actual count is 8398). For distraction, however, there appeared to be no relation; the expected count following no anger or sadness expression in the preceding second was 1922.5 and the actual count was 1935.

Another notable finding is the likelihood of anger preceding no or other regulatory behaviors ( $X^2 = 981.266$ ,  $df = 9$ ,  $p = .000$ ). The expected count of mild anger preceding no regulatory strategy is 28.3, less than the expected count of 37, but in either case highly unlikely. Additionally, the expected count of the use of any other regulatory strategies occurring in the second following mild anger expression is 155.3 and the actual count is 130. In other words, anger is likely to be followed by a behavior, and this is not limited to efforts to unlock the box. For example, the most likely behavior would occur after an anger expression is focus on the demand (i.e., the child staring at the box or keys).

Finally, relations were also found in regard to higher intensity negative emotion expressions ( $X^2 = 981.266$ ,  $df = 9$ ,  $p = .0005$ ). First, the likelihood that no regulatory behavior would occur after high intensity emotion was greater than expected by chance (expected count = 28.4, actual count = 147). Additionally, the likelihood of distraction was relatively unaffected by high intensity emotion expressions (expected count = 84.4, actual count = 92). However, other regulatory behaviors were also more likely to occur than what would be expected by chance after high intensity expression of negative emotion (actual count = 277, expected count = 155.8). For the full results, please refer to Table 2 and Figure 1, Figure 2, Figure 3, and Figure 4.

### Discussion

The present study found relations between the negative emotions a child expresses in a frustrating task and the strategy the child employs in the following second. As predicted by the

functional theory of emotions, anger expression was followed in the next second by goal-pursuing strategies – in the present study, the attempt to fix strategy – at a frequency greater than chance. Furthermore, as predicted, this effect was present only when the anger was expressed at a mild level of intensity. When negative emotion expression intensity was either moderate or high, the frequency of an attempt to fix strategy following the emotion was less than expected by chance alone. It should be noted that higher intensity sadness and anger were likely to co-occur (personal communication, Melanie Klein, master emotion coder, April 9, 2010).

The study also showed that mild expressions of sadness were more likely than mild expressions of anger to be followed by distraction - a goal-relinquishing type of strategy – because distraction involves turning attention away from the problem at hand. Interestingly, anger expression was followed by distraction at a much lower frequency than expected by chance in the one second following any intensity of anger expression, supporting the view that anger fosters focus on achieving the goal rather than turning away from it. Likewise, attempt to fix strategies followed sadness expression at lower frequencies than expected by chance, consistent with the view that sadness reflects readiness to relinquish a goal. All of the findings align with both the hypotheses of the current study, as well as the functional theory of emotion that the present study was conceptualized from.

A few other findings that were not based on predictions were also found that help to contextualize the predicted findings. First, it is notable that in the second following a mild sad expression there were high occurrences of the absence of any regulatory behavior but also the presence of regulatory behaviors other than instrumental problem solving (attempt to open the box) and distraction (shifting attention away from the box). Thus, although sadness was more likely than anger to be followed by distraction, sadness was most likely to be followed by other

behaviors and even no action at all. In contrast, other regulatory behaviors were *less likely* to follow mild anger, supporting the view that anger reflects readiness to act to overcome the obstacle to the goal. However, it must be noted that the absence of any regulatory behavior (which essentially meant the child was doing nothing) was slightly more likely than by chance to occur following mild anger expression, such that not all mild anger leads to instrumental behavior. Indeed, mostly attempts to fix the lock and turning away from the box attempt-to-fix strategies and distraction strategies that *did* occur in the task occurred with no emotion prompting. This most likely reflects the fact that the children often engage in these behaviors without any palpable expression of emotion, which could reflect the fact that they are in relatively calm states at those moments or that their emotions are at such low levels that they are not discernable in expressive behavior.

Nonetheless, the study supports the hypotheses that when an emotion is expressed at mild intensity it predicts the likelihood of the behavior immediately following that emotion expression. For example, though a child may have been engaging in an attempt-to-fix strategy before an anger expression, the child was much more likely after the anger expression to keep pursuing the goal by engaging in the same strategy. It is important to note that in the present study, not all variables were examined for analysis. As noted previously, the emotion variables of happiness and anxiousness expressions, as well as the strategy variables of bidding, verbalization, self-soothing, and focusing on the demand were excluded from analysis.

Despite the significant findings, there are some limitations that exist within the current study. Though the purpose of the current study was to simply look at negative emotions and the specific strategies that occurred following them, the approach to analyzing these relationships may have been too limiting in itself. Further research may want to look on a broader scale at all

emotions as well as all strategies within the task. The transparent locked box paradigm is designed to elicit frustration, not sadness, and perhaps a better test of the hypothesis would be to study children in both anger- and sadness-eliciting contexts. Moreover, the strategies that one can use will vary by task and it would be important to study a wider range of behaviors. This may help clarify some of the other interesting relations found in the present study. For example, sadness tends to be followed at much higher rates by no regulatory strategy or other regulatory strategies. This relation can be better examined if all strategies were included in the analysis. Furthermore, even though attempt to fix and distraction strategies occurred more frequently than just by chance alone when there was no anger or sadness preceding the strategy, it is hard to tell if these strategies happened following the other emotions of happiness or anxiousness. Though the limitation does not affect the findings that support the hypotheses of the present study, further research would better examine specific relationships with a full analysis of all coded variables.

Another limitation of the current study is that only one specific task was examined in analysis. There could be context-mediating factors that determine the strategy that follows specific negative emotion. For example, the goal-pursuing strategy of attempt to fix in a task that blocks a goal may follow anger more than in a task where there is delay of gratification, such as in the Dennis et al. (2009) study. The context of the task may indicate that different strategies may follow different emotions from task to task. Though this study demonstrates the relationship between emotion expression and strategy in a frustrating task, there are many other contexts that this relationship needs to be examined in. Furthermore, the current study did not exclude cases in which the mother remained present in the room throughout the task because the child would not separate. This can create some errors within the data because children are more likely to act in socially appropriate ways when the mother is present during the task (Grolnick et al., 1998).

However, because the instances in which the mother was in the room, did not affect administration of the task, the cases in which this happened were kept in.

A final limitation of the present study is the lack of observing specific relationships between high intensity negative emotions and strategies that followed the emotion expressions in the following second. In the present study, both anger and sadness were combined to examine the relationship of the strategy that followed high intensity negative emotion expression. Because of the low frequency of emotion intensities higher than 1, the two negative emotions were combined for a more accurate style of analysis; however, future research should disentangle the two in order to observe how high intensity of anger or high intensity of anger plays into the strategy a child employs in a frustrating situation.

Despite the limitations of the present study, it is unique from any previous study that has examined the relationship between emotion expression and behavioral strategy employed in that the current study has examined these relationships on a second-by-second level. Most fascinating is that results were found on such a conservative measure between emotion and strategy. In a single second, significant results were found to verify relationships between mild intensities of anger and attempt to fix strategies and sadness emotion expression and distraction strategies. Presumably, if the lag time between emotion expression and strategy variable were increased anywhere as high as five seconds, much higher frequencies would verify relationships even further. Currently, no studies exist that suggest the most accurate amount of time between a child's emotional expression and how much time elapses between it and the behavior that accounts for the two to be related. Because of this, the current study stayed conservative at one second. However, inferring from currently established literature, we can assume that the relationship can exist beyond one second. For example, in a classic study of calculating reaction

times to the presentation of emotional faces, 18-23 year old males show a reaction time of anywhere between 560-649 milliseconds (Roelfos, Minelli, Mars, van Peer, & Toni, 2009). Because children have slower reaction times in general than young adults, we can assume that a child's behavioral reaction to their emotion expression extends much further beyond one second. Furthermore, the conservative lag time used to examine the relationship between anger and sadness could also account for why sadness had higher frequencies of no regulatory behavior or other regulatory strategy – much higher than the relationship of distraction. Future studies could use looser times between emotion expression and strategy to see a more realistic portrayal of the relationships between the two – somewhere around three to five seconds.

Future research can take many directions from the present study. As mentioned earlier, one future direction can be to increase the lag times between emotions and behavioral strategy in order to retrieve an accurate image of the functional theory of emotions. Furthermore, this is a study that can be applied to more than just three-year-olds. Replicating this study for other ages is a logical next step from the research that has currently been set forth. Furthermore, comparing the ages longitudinally would provide insight on the developmental nature of the functions of emotions in young children. Because emotion regulation develops alongside the acquisition of other major developmental milestones, such as cognition, motivation, and sensory perception to name a few, it is logical that the functional aspect of emotion would be a developmental process, as well (Campos, Campos, & Barrett, 1989). There is such a developmental factor with emotion regulation as a whole that differences are even examined between 6 month, 12 month, and 18 month olds in emotion regulation tasks, where different ages predicted more or less of specific behaviors at each age cohort (Mangelsdorf, Shapiro, & Marzolf, 1995). There is a true age effect



that exists with emotion regulation that cannot be ignored, thus an important direction for future research.

Besides age comparisons, the current study also makes no effort to compare potential gender differences or situational differences. Though gender differences in pure emotion expression are not typically found in tasks in which the child is alone, especially at 36 months, gender differences in emotion expression have been found in other age groups for other tasks (Klein, 2010). Furthermore, gender effects have also been found in regards to strategies used in emotional situations with older children. Children in grades three through eight have demonstrated that in social problem scenarios, girls are more likely to seek social support or solve the problem on their own and boys are more likely to cope in an avoidant manner (Eschenbeck, Kohlmann, & Lohaus, 2007). Though this is a study tested on a much older population than the current study examines, gender differences do exist in children in terms of the regulation strategies they endorse, and thus can very likely exist at younger ages in the strategies they actually use. Though the literature on gender differences in emotion regulation do not provide definitive results (Cole, Dennis, Smith-Simon, & Cohen, 2009), the possibility that gender affects the relations studied in this thesis should be explored further in research.

Two important implications arise from the findings of the present study in terms of the emotions and strategies observed. The first implication is the way in which we think about the emotion of anger. Anger is very typically discussed in the literature as a negative emotion and one that leads to externalizing problematic behaviors. Research has shed light on the role of regulation of the negative emotion of anger in that the simple expression of anger is not necessarily a disposition to externalizing problems, but when anger cannot be properly regulated, it may lead to an increase in these types of problems (Eisenberg et al., 2004). This study not only

demonstrates that low levels of regulated anger do not necessarily cause problematic behavior, but it also serves a functional purpose of helping the child pursue the goal. Logically, this type of behavior assumes non-problematic behavior. The present study then not only confirms the functionality of what we constantly classify as a negative emotion, but also helps to reaffirm the concept of low levels of anger that can be regulated (in this case, by a fix strategy) do not necessarily lead to a child's development of externalizing problems.

Another implication of the current study is that sadness does not seem to be as clearly identified in terms of strategy as anger. Both the present study and the Dennis et al. (2009) study failed to find clear relations between sadness and predicted behaviors. Although distraction was more likely to be preceded by sadness than anger, other behaviors were related to sadness. It may be more important to study the *types* of strategies that follow such an emotion expression, rather than the specific strategy. On the other hand, sadness which putatively involves goal relinquishment may under some circumstances be followed by inaction, although that was not the case in this anger-eliciting task. That way, a more clearly defined relation can exist to assert a functional theory of emotion – for example, if the specific strategies all indicate relinquishing the goal, the theory is better verified than the current study allows for. Just as with anger, though, an important note about sadness is that – though sadness is frequently referred to as a negative emotion in the literature – it is able to produce useful behaviors in children during frustrating tasks, particularly ones in order to reduce their sadness.

Overall, the present study has examined emotion regulatory strategies in young children in ways that have not been conducted before in the child development literature. The relations affirmed the functional theory of emotions discussed by Campos, Campos, & Barrett (1989) and this appeared to be due in part to the capacity to study the emotion-behavior sequences at a very

fine grained level of analysis. Though this study does have its own set of limitations, the findings are still significant. Taking into consideration both the implications of such a study, as well as the directions for future research, the body of literature of emotion regulation in toddlers is an area of research that can only be expanded from this point. Furthermore, the present study changes the immediate connotations of negativity when considering the emotions of anger and sadness in that, while they are negative emotions, children have an ability to act on their emotions in functional, appropriate, and beneficial ways.

## References

- Buss, K.A., & Goldsmith, H.H. (1998). Fear and anger regulation in infancy: Effects on the temporal dynamics of affective expression. *Child Development, 69*(2), 359-374.
- Campos, J.J., Campos, R.G., & Barrett, K.C. (1989). Emergent themes in the study of emotional development and emotion regulation. *Developmental Psychology, 25*(3), 394-402.
- Carlson, S.M., & Wang, T.S. (2007). Inhibitory control and emotion regulation in preschool children. *Cognitive Development, 22*, 489-510.
- Cole, P.M., Martin, S.E., & Dennis, T.A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*(2), 317-333.
- Denham, S.A., Blair, K., Schmidt, M., & DeMulder, E. (2002). Compromised emotional competence: Seeds of violence sown early? *American Journal of Orthopsychiatry, 72*(1), 70-82.
- Dennis, T.A., Cole, P.M., Wiggins, C.N., Myftarai, L., Cushing-Savvi, A., Cohen, L.H., Zalewski, M. (2009). The functional organization in preschool age children's emotional expressions and actions in challenging situations. *Emotion, 9*(4), 520-530.
- Dennis, T.A., & Keleman, D.A. (2009). Preschool children's views on emotion regulation: Functional associations and implications for social-emotional adjustment. *International Journal of Behavioral Development, 33*(3), 243-252.
- Eisenberg, N., Spinrad, T.L., Fabes, R.A., Reiser, M., Cumberland, A., Shepard, S.A., Valiente, C., Losoya, S.H., Guthrie, I.K., & Thompson, M. (2004). The relations of effortful control and impulsivity to children's resiliency and adjustment. *Child Development, 75*(1), 25-46.

- Eschenbeck, H., Kohlmann, C-W., & Lohaus, A. (2007). Gender differences in coping strategies in children and adolescents. *Journal of Individual Differences, 28(1)*, 18-26.
- Grolnick, W.S., Kurowski, C.O., McMenamy, J.M., Rivkin, I., & Bridges, L.J. (1998). Mothers' strategies for regulating their toddlers' distress. *Infant Behavior and Development, 21(3)*, 437-450.
- Goldsmith, H.H., & Rothbart, M.K. (1996). *The Laboratory Temperament Battery (LabTAB): Locomotor version 3.0 technical manual*. Department of Psychology, University of Wisconsin, Madison.
- Klein, M. (2010). *Gender differences in young children's anger and joy expressions in challenging situations*. Unpublished undergraduate thesis, The Pennsylvania State University, University Park, Pennsylvania.
- Lengua, L.T., West, S.G., & Sandler, I.N. (1998). Temperament as a predictor of symptomatology in children: Addressing contamination of measures. *Child Development, 69(1)*, 164-181.
- Lewis, M., Ramsay, D.S., & Sullivan, M.W. (2006). The relation of ANS and HPA activation to infant anger and sadness response to goal blockage. *Developmental Psychobiology, 48*, 397-405.
- Malatesta, C.Z., Culver, C., Tesman, J.R., Shepard, B., Fogel, A., Reimers, M., & Zivin, G. (1989). The development of emotion expression during the first two years of life. *Monographs of the Society for Research in Child Development, 54(1/2)*, i+iii+v+1-136.
- Mangelsdorf, S.C., Shapiro, J.R., & Marzolf, D. (1995). Developmental and temperamental differences in emotion regulation strategy. *Child Development, 66(6)*, 1817-1828.

- Roelofs, K., Minelli, A., Mars, R.B., van Peer, J., & Toni, I. (2009). On the neural control of social emotional behavior. *Social Cognitive and Affective Neuroscience*, *4*(1), 50-58.
- Rossmann, B.R. (1992). School-age children's perceptions of coping with distress: Strategies for emotion regulation and the moderation of adjustment. *Journal of Child Psychology and Psychiatry*, *33*(8), 1373-1397.
- Shipman, K.L., Zeman, J.L., & Stegall, S. (2001). Regulating emotionally expressive behavior: Implications of goals and social partner from middle childhood to adolescence. *Child Study Journal*, *31*(4), 249-268.
- Southam-Gerow, M.A. & Kendall, P.C. (2002). Emotion regulation and understanding: Implications for child psychopathology and therapy. *Clinical Psychology Review*, *22*(2), 189-222.
- Stifter, C.A. & Braungart, J.M. (1995). The regulation of negative reactivity in infancy: Function and development. *Developmental Psychology*, *31*(3), 448-455.

Table 1

*Descriptive Statistics of Anger and Sadness Expressions and Attempt-to-Fix and Distract**Strategies in the Locked Box Task*

	M	SD	Range	Sum	Percent
Attempt to Fix	0.56	0.496	0-1	9432	53.7%
Distraction	0.14	0.35	0-1	2405	13.7%
Sad	0.13	0.498	0-3	2086	7.0%
Anger	0.05	0.249	0-3	877	4.6%
No Emotion	0.86	0.345	0-1	13978	79.6%
No Strategy	0.05	0.216	0-1	824	4.7%
Other Strategy	0.26	0.436	0-1	4295	24.5%
Mild Anger -> Fix	0.64	0.479	0-1	445	2.5%
Mild Anger -> Distract	0.09	0.286	0-1	62	0.4%
Mild Sad -> Fix	0.38	0.485	0-1	220	1.3%
Mild Sad -> Distract	0.16	0.369	0-1	95	0.5%

Table 2

*Crosstabulation between Regulatory Behavior and Sadness or Anger in One Second Lag*

*(Intensity = 1)*

Regulatory Behavior	Emotion			
	No Anger or Sad	Anger	Sad	Anger or Sad > 1
<b>No Behavior</b>				
Actual Count	487	37	59	147
Expected Count	646.4	28.3	26.9	28.4
<b>Fix</b>				
Actual Count	8398	406	212	107
Expected Count	8078.8	353.4	336.3	354.5
<b>Distract</b>				
Actual Count	1935	48	96	92
Expected Count	1922.5	84.1	80	84.4
<b>Other Behavior</b>				
Actual Count	3377	130	224	277
Expected Count	3549.3	155.3	147.6	155.8
		X <sup>2</sup>	df	p
		981.266	9	.000



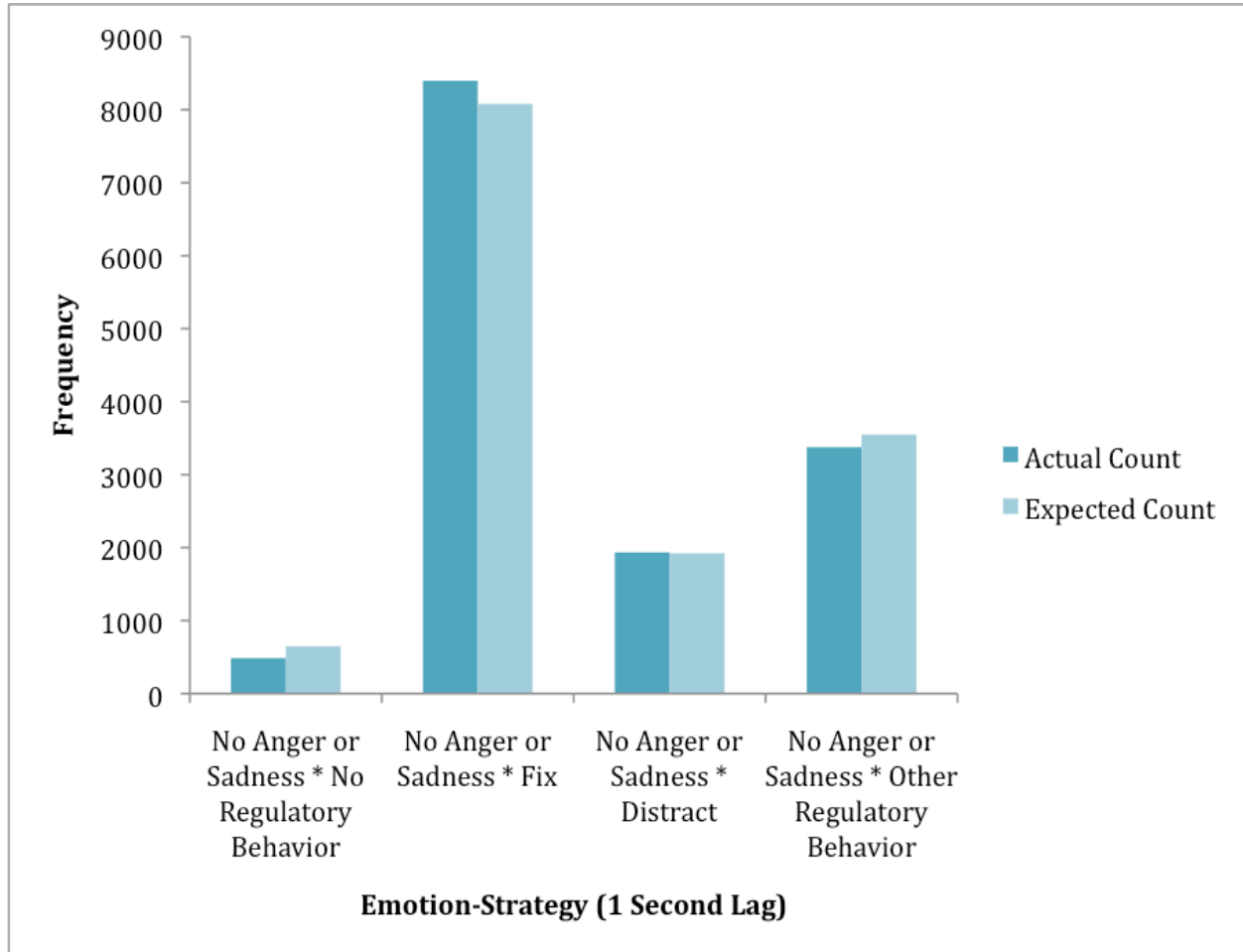
## Figure Caption

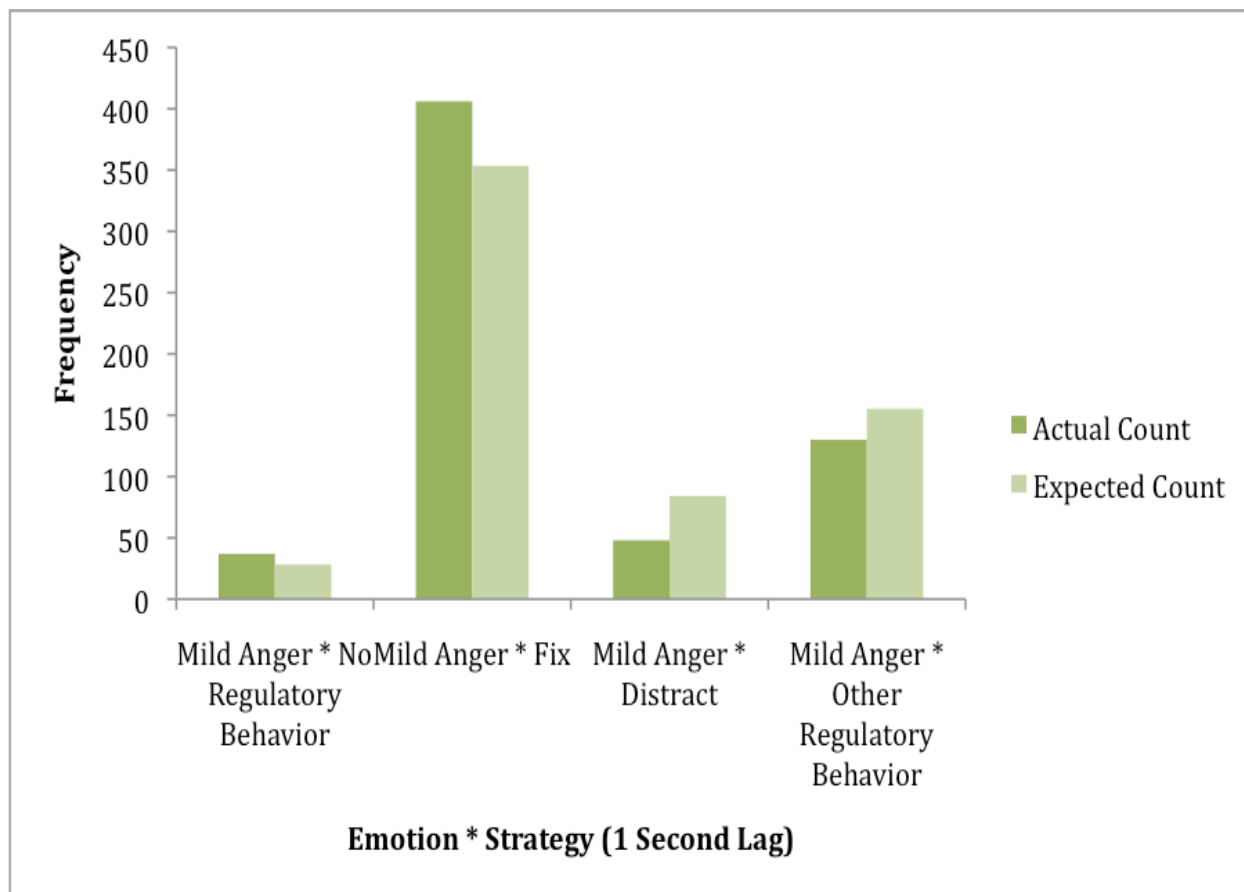
*Figure 1.* Frequencies of strategies occurring one second after emotion expression against frequencies expected by chance, no emotion expression.

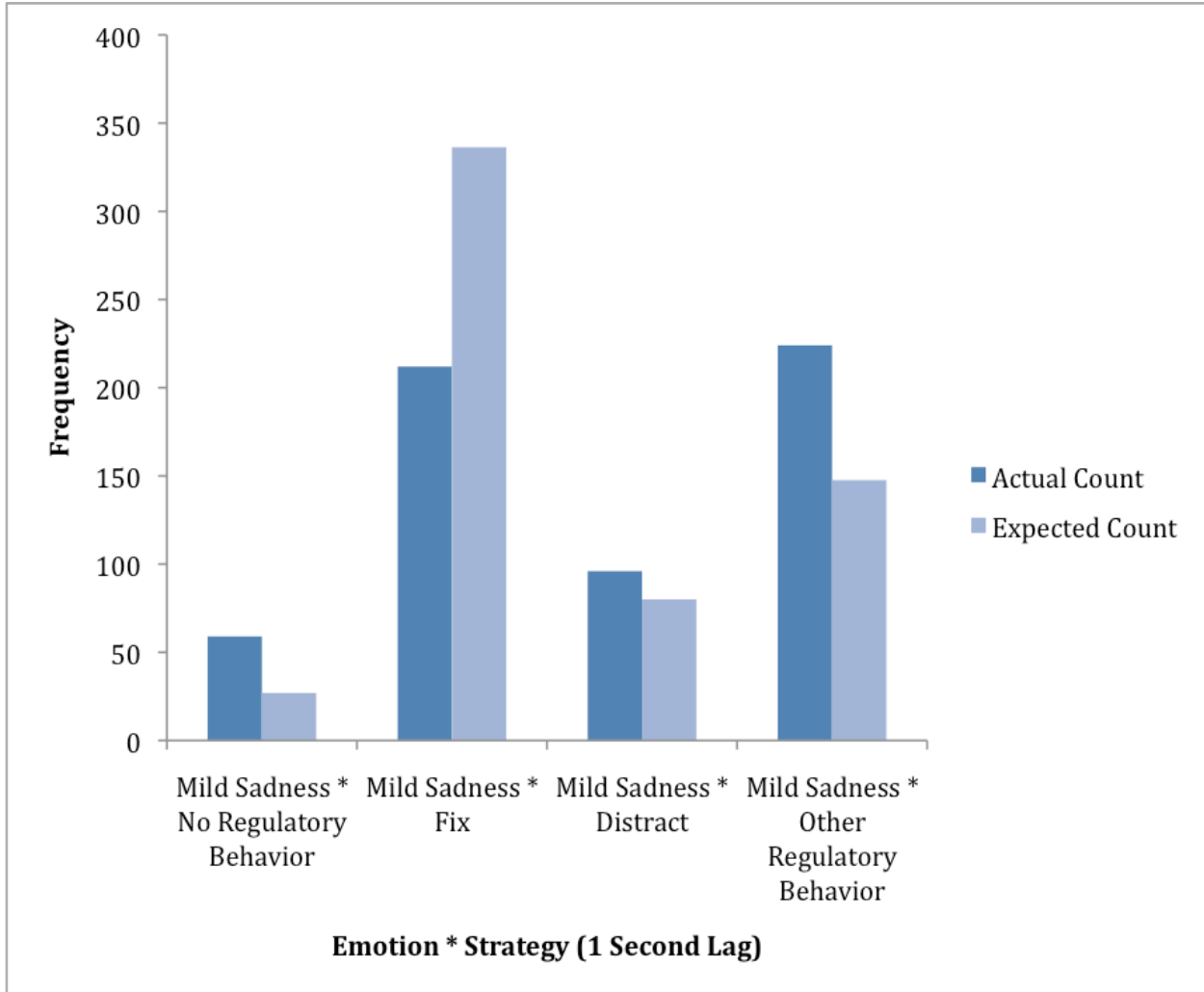
*Figure 2.* Frequencies of strategies occurring one second after emotion expression against frequencies expected by chance, mild anger expression.

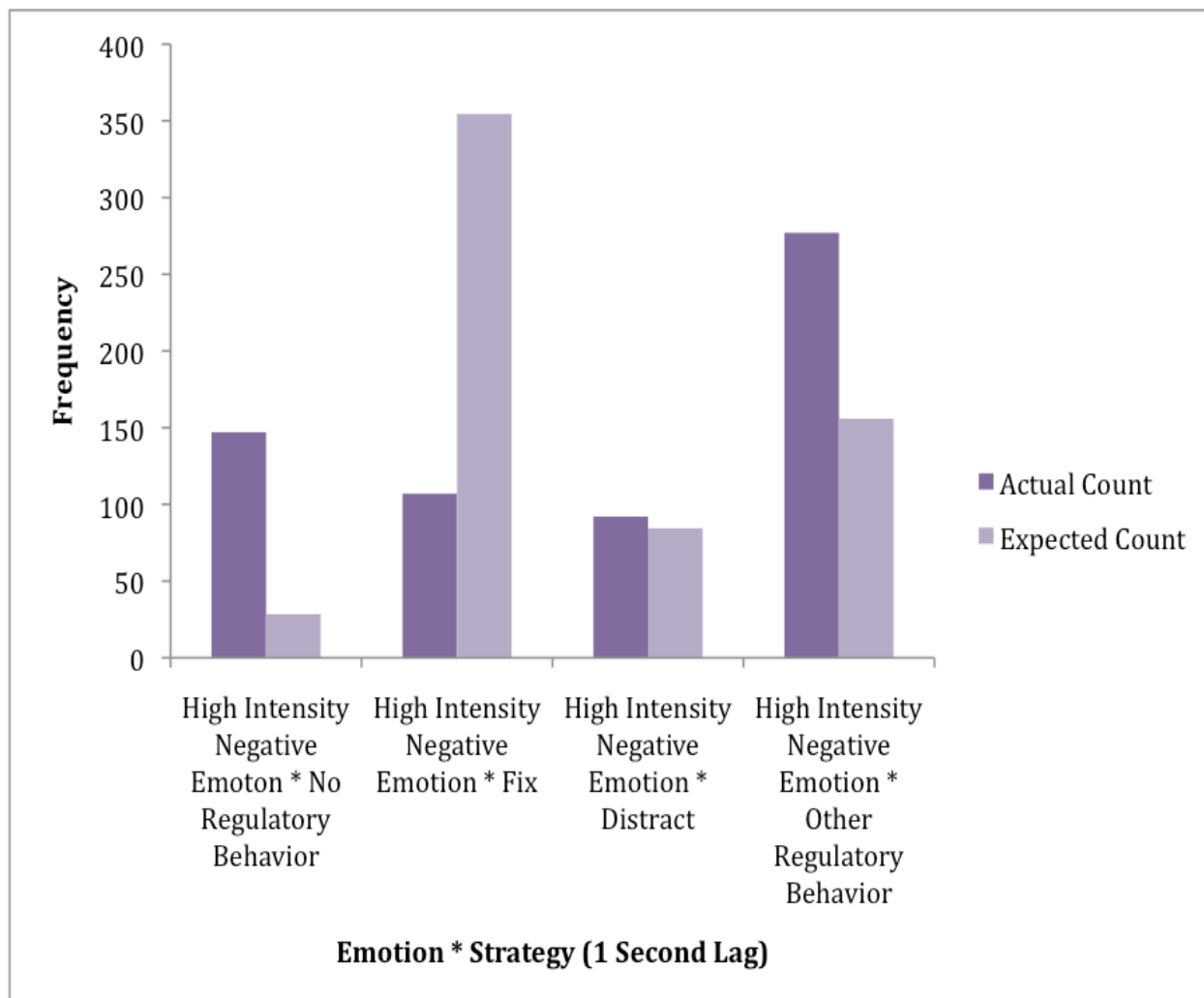
*Figure 3.* Frequencies of strategies occurring one second after emotion expression against frequencies expected by chance, mild sadness expression.

*Figure 4.* Frequencies of strategies occurring one second after emotion expression against frequencies expected by chance, high intensity negative emotion expression.









Academic Vitae

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### Education

The Pennsylvania State University

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Bachelor of Science, Psychology

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Human Development & Family Studies Minor

### Related Coursework

- Introductory Psychology
- Psychology as a Science and Profession
- Introduction to Developmental Psychology
- Introduction to Social Psychology
- Introduction to Well-Being and Positive Psychology
- Introduction to Cognitive Psychology
- Introduction to Abnormal Psychology
- Basic Research Methods in Psychology
- Psychology of Human Emotion
- Child Psychopathology
- Introduction to Clinical Psychology
- Senior Seminar in Psychology: Personality Disorders
- Elementary Statistics
- Rhetoric and Composition
- Effective Writing: Writing in the Social Sciences
- Effective Speech
- Introduction to Human Development and Family Studies
- Infant and Child Development
- Adolescent Development
- Family Development
- Family Policy
- Analysis of Family Problems

### Other Coursework

- Biology: Basic Concepts and Biodiversity
- Introductory Physiology
- Genetics and Evolution of Human Species
- Introductory Biological Anthropology

- Introduction to Biobehavioral Health
- Drugs, Behavior, and Health
- Astronomical Universe
- College Algebra I
- College Algebra II and Analytic Geometry
- Geology of the National Parks
- Environmental Science
- Dance Appreciation
- The Popular Arts in America: The History of Rock and Roll – The 1950s
- Introduction to Women’s Studies
- Introduction to Women, the Humanities, and the Arts
- Philosophy of Love and Sex
- Wellness Theory
- First-Year Seminar in Administration of Justice

## **Laboratory Experience**

*Research Assistant, Department of Psychology, The Pennsylvania State University*

-Under Dr. Pamela Cole, Fall 2007 – Spring 2010

Observed videotapes past lab visits of children in order to help gather data for a longitudinal study on the development of emotion regulation. Specifically, looked at emotion regulation on a global scale by assessing the child’s positive, negative, or neutral emotion through a series of tasks and determined if the child was performing consistently or inconsistently with the goals of the task. Furthermore, coded the strategies that children employed on a second-by-second level per task.

## **Honors and Achievements, and Memberships**

Phi Kappa Phi, inducted in 2010

Dean’s List recognition every semester, 2006-2009

Penn State Civic Engagement Public Speaking Contest participant, December 2008

Schreyer Honors College, enrolled in 2008

Psi Chi, inducted in 2008

Recipient of the Greater Scranton Chapter of the Alumni Association Scholarship, 2008

## **Co-Curricular Activities**

Penn State IFC/Panhellenic Dance Marathon, Communications Captain, 2008-2010

Penn State IFC/Panhellenic Dance Marathon, Morale Committee Member, 2006-2008

## **Other Experience**

United Neighborhood Centers, Scranton, PA

Child Care Worker, May-August, 2008; May–August 2009; December 2009–January 2010

Pegasus Child Advocacy Center, Carbondale, PA

Intern, June – August 2007