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Children's Implicit Beliefs About Intelligence

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CHILDREN'S IMPLICIT BELIEFS ABOUT INTELLIGENCE

by

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Young children are commonly perceived as highly optimistic and confident, and therefore seldom arouse concern as to how they are impacted by academic failure. However, there is evidence to suggest that young children can indeed be negatively affected by failure experiences. Implicit theories of intelligence can provide individuals with a framework by which to perceive failure, though little is known about when these theories begin to develop. The current study explores whether children as young as three and a half to four years of age demonstrate patterns indicative of incremental or entity theories of intelligence as a response to challenge following failure.

Children worked on a series of puzzles, some of which were impossible to solve. Children then chose puzzles to do again and provided reasons for their choices. Procedures were adapted from Smiley and Dweck (1994), with an added feedback condition of effort or ability. Descriptive comparisons confirmed the hypotheses that children would differ in their approach to challenge following failure; children who chose to approach challenge more often chose insoluble puzzles and those who avoided challenge more often chose soluble puzzles. In addition, challenge approach children expressed less performance concern, negative self-evaluation, and disengagement than children who avoided challenge. Finally, children who received ability related feedback

more often chose soluble puzzles than those who received effort feedback. This study suggests that even at three and half years old, children react differently to achievement related information. It is possible that at this time, children are in the process of developing implicit theories of intelligence that could direct their future cognitions, affect, and behavior in the classroom.

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CHAPTER I

Introduction

Failure is an incredibly complex experience. It is a particularly powerful experience in the classroom, where it can dictate the way children approach challenge and view themselves as learners (e.g., Diener & Dweck, 1978). In some classrooms, failure is perceived as this simple notion of "wrongness", modeled as a negative experience and emphasizing lack of ability. If failure is continuously interpreted in this way, struggling learners may eventually disengage completely, believing that they are incapable of what it takes to be a student (Hatt, 2012). School can then become an uncomfortable, self-conscious and debilitating place to be. Who would want to face that kind of environment every day, let alone attempt to learn in it? Moreover, the way children perceive and react to failure can be critical for their academic success and psychological well-being.

There are a multitude of potential sources of information that children might access in order to interpret failure, such as teachers, parents, or simply past experience. One potential source for interpreting failure is implicit theories of intelligence, which refer to beliefs regarding the malleability of intellectual ability. Individuals may hold a fixed, entity theory or a more malleable, incremental theory of intelligence (Dweck & Leggett, 1988). These theories can provide a framework through which individuals interpret achievement information across domains and tasks. That is, one's implicit beliefs about intelligence can guide perceptions of and reactions to failure throughout one's entire educational experience.

By the late elementary years, children already display patterns reflective of an entity theory of intelligence, such as a focus on performance and perception of ability as fixed (Dweck, 2002). As a result, considerable research has investigated the negative effects of a performance or ability focus by targeting older students (Blackwell, 2007; Bong, Cho, & Ahen, 2012; Gniewosz, 2011; Grant & Dweck, 2002; Linnenbrink, 2005; Pomerantz & Saxon, 2001). The current study takes a different approach, reasoning that if children already react differently to achievement situations in elementary school, perhaps interventions should be implemented before maladaptive beliefs develop and become embedded in children's perspective.

To date, it is unclear exactly when implicit theories of intelligence begin to develop. Many studies have been conducted with young children in relation to implicit beliefs (Bempechat, Perry, & Dweck, 1991; Benenson & Dweck, 1986; Heyman & Compton, 2006; Heyman, Gee, & Giles, 2003; Kurtz-Costes, McCall, & Kinlaw, 2005; Stipek & Daniels, 1988;), however fewer studies have investigated children in early childhood (Burhans & Dweck, 1995; Hicks, Liu, & Heyman, 2015; Rhodes & Brickman, 2008; Stipek, 1990), and these studies seldom focus specifically on the development of implicit theories.

The current study seeks to expand on the current literature by investigating whether children in early childhood exhibit any indication of holding implicit beliefs about intelligence. In doing so, this study can add to the current literature by contributing a fuller understanding of when and how children develop beliefs about intelligence. Through this understanding, intervention work can be more efficiently targeted in order to increase struggling learners success in the classroom.

Implicit Theories of Intelligence

The primary theoretical framework for the current study derives from work done by Dweck and colleagues (Dweck, 1986; Dweck, 2002; Dweck & Leggett, 1988; Yeager & Dweck, 2012) regarding implicit theories of intelligence. In general, implicit theories refer to fundamental beliefs or assumptions that an individual holds about personal qualities. Implicit theories are characterized as implicit due to the fact that they are seldom communicated or demonstrated explicitly. Rather, implicit theories provide an underlying framework that direct an individual's perceptions of a personal attribute. For the purposes of this study, implicit theories are discussed specifically in reference to intelligence. Implicit theories of intelligence refer to beliefs regarding the malleability of intellectual ability. Individuals may hold a fixed, entity theory or a more malleable, incremental theory of intelligence. Those who adopt an entity theory tend to view intellectual ability as something that is unchangeable and possessed in a fixed amount. In contrast, incremental theorists see intellectual ability as something that can develop over time.

It is necessary to note that although achievement goals are not a focus of the current study and are therefore not discussed, they are an integral piece of Dweck and Leggett's (1988) theoretical framework, in which implicit theories are thought to predict achievement goals (learning or performance), which in turn lead to achievement related outcomes. That is, the beliefs that children hold regarding intelligence can guide the goals they pursue in the classroom, which in turn can guide their cognitions, affect, and behavior in the classroom. Given that achievement goals have not yet been shown to operate as a direct link between implicit theories of intelligence and achievement outcomes, the present study aims to identify a systematic pattern between the implicit

theories of young learners and their achievement related cognitions, affect, and behavior in the context of failure.

Of particular importance for the present study is how implicit theories of intelligence can shape the way children view and react to failure experiences. Specifically of interest is how having an entity theory of intelligence can lead to maladaptive patterns indicative of a "helpless" response. The notion of a helpless response derives from the concept of learned helplessness, originally demonstrated in experimental studies with animals (Seligman & Maier, 1967). These authors defined learned helplessness as the perception of independence between a response and the presentation or withdrawal of a stimulus. Dweck and Reppucci (1973) proposed a connection between this phenomenon and children who give up in the face of failure, in which the child perceives what they do and what happens to them to be independent. Moreover, the child views the situation as largely out of his or her control. This notion of uncontrollability is also seen within the belief system of an entity theorist, who views intellectual ability as fixed and therefore outside of one's control.

Dweck and Reppucci (1973) confirmed this hypothesized relationship between learned helplessness and children's response to failure by experimentally inducing consistent, non-contingent failure situations with a sample of fifth grade students. They found that the children whose performance deteriorated most took less responsibility for the outcomes of their actions and attributed failure to absence of ability. In contrast, the children who persisted in the face of failure placed more emphasis on the role of effort in explaining outcomes of their behavior. These children were characterized as producing a "mastery response". Thus, the children who took less responsibility for their actions

could hold the belief that their behavior does not have an effect on their ultimate performance and therefore their failure is a result of low ability. Moreover, they could be operating from an implicit entity theory of intelligence. On the other hand, children who more often made effort attributions appeared to believe that their ability can change, perhaps reflecting an underlying incremental theory of intelligence.

Hong, Chiu, Dweck, Lin, and Wan (1999) found similar results in an examination of implicit beliefs in relation to college students' effort and ability attributions. Indeed, in the face of failure, entity theorists were less likely than incremental theorists to make effort attributions regardless of confidence level. In addition, incremental theorists were more likely than entity theorists to take remedial action (engage in a tutorial exercise to enhance learning and performance) in the face of failure. This finding is echoed by Grant and Dweck (2003), who found that goals related to learning are particularly effective over performance goals in the face of difficulty. Moreover, some motivational beliefs might not have a significant effect on students until challenge is present.

Similar findings have also been found with younger children. Cain and Dweck (1995) interviewed first, third, and fifth graders regarding achievement situations. Results indicated that first graders who demonstrated a helpless pattern were more likely than their classmates to focus on a final evaluation of a product rather than controllable processes such as their effort or classroom conduct. In addition, helpless children at each grade produced responses consistent with previous research on learned helplessness such as avoiding failure and displaying negative affect during failure. Ziegert, Kistner, Castro, and Robertson (2001) produced similar findings with even younger children using methodology developed by Dweck and colleagues (e.g., Cain & Dweck, 1995; Smiley &

Dweck, 1994). They found not only that kindergarteners displayed helpless behavior, but also that these responses to challenge predicted their response to challenge five years later. Specifically, helplessness in kindergarten predicted lower expectancies for success following failure on a block task and less persistence on a challenging puzzle task.

In addition to the impact of implicit theories of intelligence on behavioral outcomes, research further suggests that the way in which students approach and respond to failure can impact their academic achievement (Blackwell et al., 2007; Sternberg, 2014). Blackwell and colleagues explored the role of implicit theories of intelligence in adolescents' mathematics achievement in a longitudinal intervention study. Specifically, implicit theories were measured at the outset of junior high and achievement outcomes were then assessed as students progressed through seventh and eighth grade. In the authors' second study, the authors implemented an intervention which involved teaching an incremental theory to half the sample.

After measuring classroom motivation and achievement outcomes of the treatment versus control group, the authors found support for the relationship between behavioral patterns and implicit theories as well as the predictive power of implicit theories over time. Indeed, children with incremental views were found to hold more positive beliefs about effort, make less helpless attributions, and utilize more strategies in response to failure compared to entity theorists. Further, across two years of junior high school, students who endorsed an incremental theory increased their math grades beyond those who endorsed an entity theory.

Implicit theories of intelligence can also impact students psychologically through their cognitions and behavior (Burhans & Dweck, 1995; Kamins & Dweck, 1999;

Kistner, Ziegert, Castro, Robertson, 2001). In 1999, Kamins and Dweck conducted a study examining the negative effects of helplessness in relation to different forms of praise. The types of praise discussed relate closely to the beliefs within entity and incremental theories of intelligence. Process or effort praise refers to praise that provides specific feedback related to the process or task at hand (e.g., you did a great job drawing that horse), whereas person or ability praise provides global feedback related to the whole person (e.g., you're so good at drawing). Process praise is related to the incremental theory through the joint emphasis on effort and growth, whereas person praise relates to the entity theory through a shared emphasis on ability and overall performance.

Kamins and Dweck (1999) proposed that, depending on the type of feedback provided, children could be taught that their competence or worth is determined by their performance. This hypothesis was confirmed; children who received person feedback gave lower ratings of their product and self, and also showed less persistence compared to those who received process feedback. Moreover, person feedback fostered a sense of contingent self-worth and helpless responses in the face of failure.

For example, in their 2001 study, Kistner and colleagues investigated helplessness as a precursor for depression and negative self worth. In kindergarten, children's self-competence perceptions were assessed and a series of puzzle tasks (see Cain & Dweck, 1995; Smiley & Dweck, 1994) were administered. Helplessness composite scores were computed based on children's reactions to failure during these puzzle tasks. In fifth grade, the same children's self-competence, self-worth, and depressive symptoms were assessed. Results indicated that helplessness in kindergarten was associated with increased risk for depressive symptoms and negative self worth five years later.

Taken together, these studies trace a link from children's implicit theories of intelligence to their patterns of mastery and helpless behavior, which can have significant impacts on children's self-perceptions and academic achievement. The relationship between perceptions of failure, self-perceptions, and academic achievement could be especially relevant for young children. Indeed, with an achievement gap already present in pre-kindergarten (Wang, 2008), understanding how to help struggling learners is vital for researchers, educators, and families alike. If children can begin to develop beliefs that are consistent with the more adaptive incremental theory of intelligence before they enter formal schooling, they may be more likely to succeed in school and have increased self-competence perceptions throughout their education. For these reasons, the present study seeks to identify whether patterns consistent with previous findings on implicit theories and cognitive-affective-behavioral patterns can be found in an early childhood sample.

Attribution Theory

Implicit theories of intelligence guide the way students explain and interpret academic outcomes. That is, depending on an individual's view of intelligence, he or she attributes outcomes to different causes, which in turn guides his or her response to a situation. According to the intrapersonal attribution theory of motivation (Weiner, 1970, 2005), the motivational process begins with the academic outcome and is then followed by an affective reaction (positive or negative). Subsequently, an individual explores why the outcome occurred. This exploratory phase more often occurs when an individual is faced with a negative, unexpected outcome. The answer to this "why" question constitutes a causal attribution and is the intersection of attribution theory and achievement motivation.

Locus, stability, and controllability are characterized in attribution theory as underlying properties of the cause to which individuals attribute an outcome. These properties are important for understanding the joint impact of achievement motivation (implicit theories) and attribution theory. Locus refers to the location of the cause, stability describes the duration, and controllability refers to whether the cause is controllable or uncontrollable. These core characteristics not only qualify the cause selected, but also have subsequent behavioral and psychological effects. For instance, locus influences feelings of pride in accomplishment and self-esteem. In conjunction with locus, controllability influences whether guilt or shame is experienced following nonattainment of a goal.

The beliefs associated with entity and incremental theories of intelligence relate especially closely to these underlying causal dimensions. For entity theorists, the controllability of a cause is more likely to be perceived as uncontrollable (e.g., math ability) whereas incremental theorists more likely perceive the attributed cause as under their control. Perceptions of stability and locus could be similar for both entity and incremental theorists. For example, luck is perceived as external and uncontrollable and effort is perceived as internal and controllable from the perspective of both theories. The critical impact of implicit theories enters here, where the beliefs that a student holds can direct the causal ascription selected. Indeed, if a cause is qualified to have an internal locus, this is not necessarily detrimental. However, a student will experience the situation very differently depending on if that internal cause is attributed to low ability (entity theory) or low effort (incremental theory). In this way, attribution theory is intimately related to the consequences of adopting an entity or incremental view.

Many researchers have conducted studies connecting achievement situations with attribution theory (Dweck, 1975; Hanusa & Schulz, 1977; Hong, Chiu, Dweck, Lin, & Wan, 1999; Weiner, 2010). Hong and colleagues specifically aimed to integrate attribution theory with Dweck & Leggett's (1988) model of implicit theories of intelligence. The authors hypothesized that entity theorists would create ability attributions and incremental theorists would create effort attributions, which would then facilitate mastery-oriented coping. Results supported the researchers' hypothesis, and even showed that the confidence level of entity theorists did not appear significant for their attribution patterns. That is, high confidence entity theorists were no more likely than low confidence ones to attribute failure to effort.

Attribution theory also offers great potential for future interventions through attribution retraining programs (Chodkiewicz & Boyle, 2014; Dweck, 1975; Forsterling, 1985; Heller & Ziegler, 2000; Horner & Gaither, 2004; Marsh, Craven, & Debus, 1991). Indeed, research has demonstrated that student learning can be improved through cognitive interventions that do not focus on any one task or skill (Koles & Boyle, 2013; Toland & Boyle, 2008). Such interventions are critical as a realistic option for younger children, as demonstrated by Dweck (1975) and Horner and Gaither (2004) with second graders. Based on this research, a cognitive motivational intervention fusing attribution theory and implicit theories of intelligence could provide critical adaptive foundations for young learners.

Developmental Considerations

Note that the research studies outlined in this section are exclusively related to very young children (kindergarten and below) due to the primary focus and sample of the

current study. There is a multitude of additional research that demonstrates how older elementary children are impacted by achievement situations (Bong, Cho, Ahn, & Kim, 2012; Denissen, 2007; Kasanen, Raty, & Eklund, 2009; Simpson, Licht, Wagner, & Stader, 1996; Viljaranta, Tolvanen, Aunola, & Nurmi, 2014;).

Many studies examining implicit theories of intelligence have been conducted with upper elementary, secondary, and college students, with a much smaller number conducting such research with children in early childhood. This trend is not surprising given the common notion that young children lack an ability to realistically produce self-evaluations or interpret concepts such as ability, effort, or intelligence (Nicholls, 1990; Nicholls & Miller, 1984). Nicholls (1990; Nicholls & Miller, 1984) frames ability as a broad concept that extends beyond the notion of academic intelligence across domains of accomplishment.

In his research with young children, Nicholls (1990) found that although young children can make social comparisons, they do not have normative conceptions of difficulty and ability. In addition, children could not differentiate between ability and effort until about age ten. Rather, he found that children begin with the perception that effort is ability (e.g., people who try harder are smarter despite their performance, and people who score higher work harder regardless of actual effort expenditure) and then gradually differentiate between the two until they perceive ability as capacity.

Given this research, it seems natural to conclude that young children are virtually immune to any detrimental effects of failure; if failure has no impact on ability, there's no reason for it to be experienced negatively. However, a great deal of research has demonstrated that although young children may not have a complete understanding of

ability, they can indeed be negatively impacted by failure experiences (Diener & Dweck, 1980; Heyman, Dweck, & Cain, 1992; Rhodes & Brickman, 2008; Smiley & Dweck, 1994; Ziegert et al., 2001). For instance, Smiley and Dweck (1994) found individual differences in responses to failure experiences in children as young as four and five years old. These differences reflected the predicted patterns of maladaptive cognitions, affect, and behavior indicative of helplessness.

Ziegert and colleagues (2001) similarly found evidence of helpless behavior in kindergarteners, expanding on previous studies to demonstrate that such patterns predicted children's approach to challenges five years later. In a more recent study, Hicks and colleagues (2015) found that, by age three, children recognize that the context of performance outcome impacts self-disclosure. That is, children recognize that people are relatively more reluctant to disclose failures than successes. This finding illustrates young children's ability to reason about not only achievement situations but also failure specifically. Indeed, at three years old these children appeared to recognize that failure is something negative that is best kept private.

Additional research further suggests that young children use and respond to achievement information in important ways (Cain, Heyman, & Walker, 1997; Cimpian, Arce, Markmen, & Dweck, 2007; Heyman & Compton, 2006; Heyman, Gee, & Giles, 2003; Hicks, Liu, & Heyman, 2015). Cain and colleagues (1997) found that preschoolers, like older children and adults, see past behavior as providing information about likely future behavior. In addition, preschoolers generalized information from the sociomoral domain to the domains of intelligence and athleticism, suggesting that some children may view the information as part of an underlying global concept. This notion is critical given

that implicit theories of intelligence apply across domains in a similarly comprehensive manner. If preschoolers can recognize the application of a belief across contexts, they are likely capable of holding and operating from similar types of beliefs regardless of how aware of such beliefs they might be.

Further, Heyman and her research team (2003) found that preschoolers hold systematic beliefs about ability. In particular, preschoolers showed a systematic tendency to infer that a child who finds a task to be easy is smarter than a child who finds that task to be difficult. Similarly, Heyman and Compton (2006) found that five-year-old children are sensitive to subtle contextual cues when making inferences about ability. Specifically, the authors' results indicated that children who were primed to consider the perceived difficulty of the task were more likely to view ability as a static quality. These findings suggest that children are influenced by implicit cues that are available to them in their environment. In this way, shaping young children's beliefs toward adaptive perspectives of intelligence may be much more feasible than previously thought.

Not only do young children recognize and act on achievement relevant information, but they are also capable of producing self-evaluations (Jennings, 2004; Kelley, Brownwell, & Campbell, 2000; Lewis, Allesandri, & Sullivan, 1992; Stipek, Recchia, & McClintic, 1990). Stipek and her research team (1990) as well as Lewis and colleagues (1992) demonstrated that children as young as three years old are capable of engaging in self evaluative judgments and experiencing pride and shame relative to success and failure on a task. Jennings (2004) further showed that by age two and a half, the large majority of toddlers display pride at least occasionally upon completing a task. The ability to self evaluate is especially critical for the research questions at play in the

current study. Indeed, if children can actively think about themselves in critical ways, then the helpless and mastery patterns displayed in older children could also be evident in younger children.

A final thought regarding developmental considerations is in regard to the measurement process. With young children, it is especially critical that the operationalization of the relevant constructs is appropriate for the age group involved. For example, Stipek and MacIver (1989) noted that the verbal assessment methods used in research with young children could restrict children's ability to articulate distinctions between concepts. Cain et al. (1997) expressed similar concerns, highlighting the importance of including salient pieces of behavioral information, concrete tasks, and reducing memory and verbal production demands. Many researchers have expressed concern with achievement motivation measures in general (Murphy & Alexander, 2000; Pintrich, Conley, & Kempler, 2003; Wigfield & Cambria, 2010), cautioning the comparison of findings that define and operationalize motivational constructs differently.

The studies discussed of course do not disprove Nicholls' (1990) findings regarding children's developmental restrictions, but instead provide an additional important perspective to consider. Young children are undeniably limited in their capacity to articulate themselves and understand abstract concepts, however research clearly demonstrates that young children notice and respond to achievement information in systematic ways. However implicit the message and manifestation of such information may be, young learners are significantly impacted by the feedback they receive. Moreover, it is critical for educators and parents to consider the kinds of implicit

information they communicate to children and for researchers to conduct careful, thorough research with young learners.

Research Questions and Hypotheses

The overall question that guides the current study is: Do implicit theories of intelligence begin to develop in early childhood? If children do hold implicit beliefs about intelligence, they may convey such beliefs through the way in which they think, feel, and behave in response to failure and challenge. It is hypothesized that patterns indicative of the mastery and helpless responses in relation to implicit theories of intelligence will be evident even in children three and half to four years of age. To that end, there are two sets of research questions.

First, how do children respond to experience with failure (i.e., insoluble puzzles)? Embedded within this question are three sub questions: a) What type of puzzles will children choose after experiencing failure? b) What will children state as reasons for their puzzle choice? c) Will children's choice and reason for choice be in agreement?

Responses to failure experience are expected to differ across children. Specifically, the types of puzzles that children choose following failure are expected to reflect their self-conceptions of ability, spontaneous verbalizations, performance, emotion, and future expectancies for success. For example, a child who verbalizes performance concern, shows a decline in on task performance, lower ratings of emotion, or negative expectancies for future success is expected to choose soluble puzzles post failure. However, children who express strategic verbalizations, maintain on task performance, report higher emotions and positive expectancies for success are expected to choose insoluble puzzles. In addition, the reasons that children provide for their puzzle

choices are expected to differ and are expected to be in agreement with the puzzles they choose to rework. For example, children who choose to rework soluble puzzles are expected to explain their choice through a No Challenge or Want/Like reason and not a Challenge response. Children who choose to rework insoluble puzzles are contrastingly expected to provide a Challenge or Want/Like reason and not a No Challenge explanation for their puzzle choice.

Second, does effort- or ability-related feedback impact the way three and a half to four year old children approach challenge? It is expected that more of the children avoiding challenge (i.e., choosing soluble puzzles and providing No Challenge reasons) will have received ability, rather than effort, feedback. In essence, children in this no challenge group are expected to reflect an entity theory of intelligence through their focus on performance and ability as well as their helpless-like response to failure.

In contrast, children who more often approach challenge (i.e., choose insoluble puzzles and give Challenge reasons) are expected to be in the effort feedback condition. Children in this challenge approach group are anticipated to reflect an incremental theory of intelligence through a focus on learning and effort and their mastery response to failure.

CHAPTER II

Method

Participants

Thirty children from a mid-sized mid-western city participated in this study. Participants were predominantly White (87%), age 3 ½ - 4 years old (M = 45 months). Family income ranged from 25,000-30,000 to more than 125,000, with an average income of 75,000-80,000. Twenty-one boys (70%) and 9 girls (30%) participated in this study.

Children were recruited from a larger study conducted at a large mid-western university. Participants became eligible upon completion of this larger study and were recruited via phone. Demographic data as well as cognitive assessment scores were obtained from existing data collected in this larger study. Data collection for the present study took place between November of 2014 and March of 2015.

Procedures

The data collection procedures in this study were adapted from Smiley and Dweck (1994), with minor changes made due to the younger age of the participants. Changes included reducing the number of faces on the emotion scale from five to three, phrasing all questions in terms of the current context (e.g., how do you feel right now versus how did you feel when you were working on that puzzle). In addition, a feedback condition was included that was not involved in Smiley and Dweck's (1994) study. Half of the children in the sample were randomly selected to receive ability related feedback ("you are really good at puzzles") and the other half of the children received effort

feedback (“you worked really hard on that puzzle”). See Table 6 for details regarding these measures.

Data collection occurred at a child’s home in a quiet and comfortable location (e.g., the living room). Testing sessions ranged from nine to fourteen minutes. Each test session was audio recorded. Materials included five eight-piece puzzles, a three-point emotion scale (happy, middle, sad), a stopwatch, and a testing sheet.

First, children were trained on the emotion scale using hypothetical situations for happy (e.g., “let’s pretend you have a big ice cream cone right now, how would you feel if you had a big ice cream cone?”) and sad (“let’s pretend your favorite toy got lost, how would you feel if your favorite toy got lost?”). Children’s understanding of each end of the emotion scale was recorded. Before starting the puzzles, children’s self evaluations of puzzle solving ability was also assessed (“are you good at puzzles or not so good at puzzles?”).

Next, children worked on a total of seven puzzles. First, children worked on a soluble puzzle until completion. Then, children worked on three insoluble puzzles for one minute each. Puzzles were made insoluble by replacing two of the correct puzzle pieces with two different puzzle pieces with similar stimuli (e.g., a different dog and horse or different trucks). Children then worked another soluble puzzle until completion. The solution times for the initial soluble puzzle and the last soluble puzzle were recorded. In addition, after completing these two soluble puzzles, children received one of two feedback conditions (“you’re really good at puzzles” or “you worked really hard on that puzzle”). Following each insoluble puzzle, children’s expectancies for future success were assessed by asking, “If you could work on this puzzle all day, do you think you

could finish it?" Before and after each puzzle, children were asked how to indicate how they felt at that moment on the emotion scale (happy, middle, sad). After the last soluble puzzle, children were again asked if they thought they were good or not so good at puzzles. The order of these five puzzles was randomized.

Children were then instructed to choose two puzzles to do again ("let's do another puzzle, this time you get to pick, which one would you like to do again?"). For these puzzles, the correct pieces were restored for the insoluble puzzles in the event that the child chose those puzzles, as these last two puzzles were worked on through completion. Following their puzzle choice, children were asked why they chose that puzzle. Puzzle choices and reasons were recorded on the testing sheet.

Children's puzzle choices were coded into two categories: soluble or insoluble. Children's reasons for their puzzle choices were coded into four possible categories: challenge (positive interest in trying to solve the puzzle), no challenge (referring to ease of the task), want/like (desire or preference for particular puzzle), and no reason (claiming I don't know or not responding at all). See Table 3 for specific examples of these categories.

Recordings of test sessions were transcribed for each child and utterances were coded into eight possible categories: performance concern (concern with adequate performance), negative self-evaluation (lacking skills or knowledge required), disengaged (expressions of withdrawal or suggestions of another task), strategy (deliberate, positive task engagement), task appropriate solution (remarks normally accompanying a search or fit of pieces), task appropriate difficulty (indicating difficulty of puzzle), task irrelevant

(unrelated to puzzle task), ambiguous (sentence fragments unable to be understood or coded). See Table 5 for specific examples of these categories.

Measures

Child based. Children's affect was measured using the 3-point face scale including happy, middle, and sad. Self evaluation of ability was measured by asking the child "are you good or not so good at puzzles?" and expectancies for future success were assessed by asking, "If you could work on this puzzle all day, do you think you could finish?"

Task based. The difference between solution times with the first and last soluble puzzles was used as a measure of performance decline following failure experience. On-task performance was measured by the number of pieces the child inserted correctly for each insoluble puzzle. The time to complete the first puzzle was used as a measure of puzzle solving ability.

Analytical Approach

The majority of the measures that were administered based on Smiley and Dweck's (1994) study were not used in analyses because responses were fairly uniform across participants. Such measures included children's puzzle solving ability, child affect, on-task performance, performance decline, and self-evaluation of ability. Due to the fact that differences among these data were negligible, they were not included in any analyses and are not discussed in the results. Rather, the primary information relevant for the current analyses are puzzle choices, reasons for puzzle choice, feedback, spontaneous verbalizations, and expectancies for success.

The intention for the current study was to replicate analyses conducted by Smiley and Dweck (1994) with a younger sample of children. In the Smiley and Dweck (1994) study, children were first grouped into learning and performance groups according to their puzzle choices and reasons. This step was completed in the current study; however, the learning group only consisted of two children and the performance group consisted of only six children. So, the groups did not have enough children to conduct statistical tests.

Means, standard deviations, and frequencies were calculated and compared for all variables. In addition, chi square tests were conducted in order to investigate the study hypotheses. Specifically, chi square tests for independence were employed to compare the frequency of children's puzzle choice and reasons for puzzle choice. In addition, chi square tests for independence were conducted to determine whether children's puzzle choices and the feedback they received were independent.

CHAPTER III

Results

For the first research question (how do three to four year old children respond to experience with failure?), individual differences were found in the puzzles that children chose following failure. Specifically, the majority of the children chose to rework soluble puzzles (60% of first puzzle choice, 57% of second choice) and gave Want/Like reasons (40% of first choice, 33% of second) for doing so.

In addition, frequencies of children's spontaneous verbalizations indicated that verbalizations during failure were reflected in their puzzle choice following failure. As presented in Table 5, of the children who produced verbalizations expressing performance concern (50%), the majority of them (73%) chose to rework soluble, rather than insoluble, puzzles. This same pattern was found for the children who expressed negative self evaluation (33%) and disengagement (23%), where 60% of the negatively self-evaluating children and 71% of the disengaged children chose to rework soluble, rather than insoluble, puzzles. Unexpectedly, 60% of the children who produced verbalizations indicative of strategy (67%) also chose to rework soluble puzzles more often than insoluble ones.

Children's self-conceptions of ability, emotion ratings, and performance decline were largely uniform across participants. That is, children primarily expressed high confidence in their puzzle solving ability, rated their emotion as happy, and demonstrated consistent on-task performance. Only six (20%) children showed any performance decline, and majority of these children chose one of each type of puzzle (soluble and insoluble) to work on. Twelve children (40%) showed an increase in task performance

across insoluble puzzles, but again mostly chose to work on one of each kind of puzzle. Only 13 children reported emotions other than happy (i.e., middle or sad) and were evenly split in the puzzles they chose to work on. All but two children (one before puzzles and one after) indicated that they were good at puzzles, demonstrating an overall high evaluation of puzzle solving ability.

Of the two children who indicated that they did not think they were good at puzzles, both of these children provided No Challenge explanations for their puzzle choices on both occasions. Children's expectancies for future success were also primarily uniform across children, with most children indicating positive expectations for successfully completing insoluble puzzles in the future. However, of the eight children who did indicate a negative expectancy for future success on insoluble puzzles, the majority of them (75%) chose to rework soluble puzzles following failure.

Children's responses to failure were examined in terms of how they would explain their puzzle choices and whether or not their choices and explanations would be in agreement. Overall, children primarily provided Want/Like reasons (53%) for their puzzle choices. The second most common category for reasons offered was No Challenge (17-20%), followed by No Reason (7-10%) and Challenge (7%). As expected, children displaying an approach to challenge (i.e., choosing insoluble puzzles and giving Challenge reasons for choices) preferred to rework insoluble puzzles and those seeking to avoid challenge (i.e., choosing soluble puzzles and providing No Challenge reasons) more often chose to rework soluble puzzles.

As shown in Table 7, for children's first and second puzzle choices, only one child provided an explanation inconsistent with his puzzle choice (i.e., insoluble puzzle

with no challenge reason). Although only two children provided reasons indicating an approach to challenge, both of these children chose to rework insoluble puzzles. Five children during the first puzzle choice and six children during the second gave explanations reflecting an aim to avoid challenge, with all but one choosing to rework soluble puzzles. Chi square tests for independence were conducted to test this comparison statistically, however results were insignificant for both the first ($X^2_{3, N = 30} = 5.54$, $p = .136$) and second ($X^2_{1, N = 30} = 5.25$, $p = .154$) puzzle choice and corresponding reason.

Results for the second research question (whether effort- or ability-related feedback would impact three to four year olds' approach to challenge) showed that most of the children who received effort feedback (73%) provided a Want/Like response. Children who received ability feedback did not appear to provide any consistent type of reason for their puzzle choices. As expected, children who received effort feedback more often chose to rework insoluble puzzles than those who received ability feedback.

As shown in Table 8, children who received effort feedback (N=15) chose to rework insoluble puzzles (53%) more than soluble ones. Furthermore, of the children who received ability feedback (N=15), more children chose to rework soluble puzzles (67%) than insoluble ones. In addition, children who provided Challenge reasons were in the effort feedback condition and all but one of the children who gave No Challenge explanations for their puzzle choice received ability feedback. Chi square tests for independence were conducted to determine whether these findings were statistically significant, however results for both the first ($X^2_{1, N = 30} = .556$, $p = .456$) and second puzzle choice ($X^2_{1, N = 30} = 1.22$, $p = .269$) were insignificant. It is worth nothing that while only two children showed a decline in on task performance, both of these children

were in the ability feedback condition. Second, of the eight children who reported negative expectancies for future success on insoluble puzzles, five of them (63%) were in the ability feedback condition.

CHAPTER IV

Discussion

This study explored implicit beliefs about intelligence in three to four year old children by investigating differences in children's responses to failure. A pattern reflecting Dweck and Leggett's sociocognitive model of achievement motivation was expected to emerge through children's cognitive, affective, and behavioral responses. The results from this study suggest that children's experiences with failure may be related to the way in which they approach challenge as early as three and a half years old.

Two main patterns emerged from this study in relation to children's willingness to confront challenge following failure. First, children who gave reasons for their puzzle choices indicative of confronting challenge (Challenge group) had received effort feedback, chose to work on insoluble puzzles, and produced only one verbalization indicative of performance concern. The children who provided reasons for their puzzle choices indicating avoidance of challenge (No Challenge group) had received ability feedback, chose to work on soluble puzzles, and produced more verbalizations reflecting performance concern, disengagement, and negative self-evaluation.

Smiley and Dweck's (1994) study also found that children who chose to rework insoluble puzzles were most likely to provide a Challenge or Want/Like reason, whereas children who chose soluble puzzles never provided a Challenge reason and the majority offered a No Challenge reason. Although in the current study only two children made up the Challenge group and six were in the No Challenge group, it is remarkable that a pattern emerged at all from data with such a small sample and with children so young. In

fact, there was only one child who demonstrated a pattern inconsistent with the hypotheses (i.e., chose to rework insoluble puzzles and provided no challenge reasons).

The findings from this study are also striking in light of concerns with young children's capability to differentiate between ability and effort (Nicholls, 1990; Nicholls & Miller, 1984). The present study showed that overall and as expected, children who received ability feedback more often chose to rework soluble puzzles and those who received effort feedback more often chose insoluble puzzles. In addition, as anticipated, children in the Challenge group all received effort feedback while those in the No Challenge group had received ability feedback. Furthermore, the only two children who showed a consistent performance decline across failure trials as well as the majority of the children with negative expectancies for success had received ability feedback. While these findings certainly do not demonstrate children's understanding of ability as a general concept, it does show that children react differently to ability related information as early as three and a half years old.

There are several factors that might explain why these findings were not supported by statistical significance (through chi square tests). First, with only 30 children the sample size is small, making it harder to detect effects from statistical tests. In addition, it is more difficult to gather consistent results with young children, which could add further potential error. Even given the insignificant results, however, the descriptive findings alone suggest that children may be impacted by ability or effort information irrespective of whether they are capable of defining such concepts.

It is noteworthy that the majority of the children in this study chose to rework soluble puzzles. Given the general optimism and high levels of confidence typically

observed in young children, one might expect most of the children in this sample to have no issue approaching challenge (i.e., choosing insoluble puzzles). Even though 93% of children reported high confidence in their puzzle solving ability, only 30% consistently chose to rework insoluble puzzles. Furthermore, only two of the children who did choose insoluble puzzles explained their choice through a Challenge response. This suggests that even in early childhood, children appear to choose to avoid challenging experiences. The precise reasons why children chose to avoid challenge in this study can only be speculated, but it is striking that despite high levels of confidence, so many chose to work on puzzles that they knew they could solve.

Given the age range of the children in the sample, it is not surprising that the most common utterance category was Task Irrelevant. It is interesting to note, however, that Disengagement was the least common type of utterance produced. One might expect that if children are primarily producing utterances categorized as irrelevant to the task at hand, they would also then be disengaged. However, when the content of children's utterances is taken into account this finding is less perplexing. The majority of children's task irrelevant utterances were in response to particular stimuli presented on a puzzle piece (e.g., "I like dogs"). Moreover, children's attention and interest was typically directed toward the puzzle even if they spoke about elements that were unrelated to actually solving the puzzle.

As expected, children who produced utterances in Performance Concern, Negative Self-Evaluation, and Disengagement categories more often chose to rework soluble puzzles. This finding is consistent with Smiley and Dweck's (1994) results, where children in the performance goal group produced more Performance Concern,

Disengaged, and Negative Self-evaluation utterances than children in the learning goal group. It is important to note, however, that in the current study soluble puzzles were also the most common choice for children who produced strategic verbalizations. In fact, children within the No Challenge group produced four times as many strategic utterances as those in the Challenge group. This is in stark contrast to Smiley and Dweck's (1994) findings, where no group differences were found for the strategy utterance category.

This phenomenon could be explained by the fact that children tended to choose soluble puzzles in this sample overall. It might also reflect young children's tendency to self-guide throughout problem solving experiences. That is, perhaps those children who were more strategic in their verbalizations were also those who became particularly frustrated during failure, and consequently verbalized both their distress and approach to solving the puzzle. It may be that at this age, children who avoid challenge still employ problem-solving techniques in the face of failure. This notion lends further support for targeting research in early childhood to preserve such strategic techniques of struggling learners.

Limitations

The current study is not without limitations. The sample for this study not only is small, but also homogenous with regard to ethnicity and income. Majority of the children in this sample came from White, middle to upper class families. In addition, information regarding children's experience with puzzles or knowledge about puzzles was not collected and therefore it is possible that children who were willing to work on insoluble puzzles pursued challenge more often due to prior knowledge or experience. Finally, there were several children who potentially realized (during puzzle choices) that there

were different pieces available. As a result, these children could have perceived the insoluble puzzles as far less of a challenge than those who did not observe the differences across pieces.

Implications and Future Directions

The current study expands on existing research by demonstrating that children might think and react to achievement situations differently already in early childhood. It is possible that at this time, children begin to develop beliefs about achievement that then form their implicit theories of intelligence. In this way, children may be vulnerable to implicit messages about intelligence and achievement before even entering formal schooling. For this reason, it is critical to more deeply understand exactly when and how such beliefs develop into implicit theories. For instance, is there something about the classroom setting that initiates the development of such beliefs, or do beliefs develop first at home? If young children do hold some form of implicit theory, when is there a direct impact on child outcomes? Do teachers or parents have more of an influence on the beliefs that children develop?

Some research has started to answer these questions, showing that parental negative evaluations can influence children's self-evaluations and emotions (Kelley et al., 2000) and that the type of praise provided by parents can impact children's motivational framework (Gunderson, Levine, Gripshover, Romero, & Dweck, 2013; Pomerantz & Kempner, 2013). It is also known that teachers' perceptions and expectations can have a profound impact on student outcomes (Jussim & Harber, 2005; Ready & Wright, 2010). Future research is needed, however, to clarify the impact of parents compared to teachers on young children's perceptions of intelligence and achievement.

The current study further provides important information toward more efficiently targeted cognitive and motivational interventions. If children begin to develop implicit beliefs about intelligence in early childhood, preschool may ultimately be the most effective period for interventions to be implemented. Indeed, attribution-retraining programs (e.g., Good, Aronson, & Inzlicht, 2003) that aim to encourage incremental theories of intelligence could have a more lasting impact if they are administered in early childhood.

Such interventions may be especially effective when conducted with teachers in early childhood settings. Indeed, implicit beliefs about intelligence could be communicated through the way in which failure is handled in the classroom. It is possible that if children observe educators interpreting failure in an opportunistic and constructive manner, they could transfer that method of interpretation to their own experiences. Future research should explore how this type of teacher-based intervention could improve young children's perception of failure and approach to challenge.

How children view intelligence does not just affect how they view themselves as students, it can affect how they view the educational system as a whole. Through a qualitative investigation exploring kindergartners perception of "smartness", Hatt (2012) concluded that some children disengage from school early on because they learn that they do not belong in school, and therefore it is not worth investing in. If children are undeterred by academic failure and approach challenges with confidence in their ability as students, such disengagement from school might be avoided. It could be critical for young learners future success as students to perceive failure as an opportunity rather than personal inadequacy. Findings from the current study suggest that children may be

receptive to achievement related information as early as three and half years old. Further exploration into the effects of implicit beliefs in early childhood classrooms is essential to the success and well being of young learners.

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Tables

Table 1.

Children's Age, Income, and General Cognitive Ability Scores

	N	Minimum	Maximum	Mean	Std Dev
Age (months)	30	43	51	45.17	2.55
Income (thousands)	29	25-30	More than 125	85-90	5.18
GCA Score	30	75	128	105.93	13.59

**Note: GCA score is from the Differential Ability Scales (DAS) cognitive assessment*

Table 2.

Distribution of Children's Sex and Ethnicity

Sex	
Male	21 (70%)
Female	9 (30%)
Ethnicity	
White	27 (90%)
Hispanic/White	1 (3.3%)
Asian/White	1 (3.3%)
Black/White	1 (3.3%)

Table 3.

Examples of Children's Reasons for Puzzle Choices

	Challenge	No Challenge	Want/Like	No Reason	Uncodeable
Example	"Because I didn't finish it" or "It's hard and I want to do it"	"I really know how to do this one" or "Because it's easy"	"I just want to" or "I like trucks"	"I don't know" or "I just do"	"It has the other pieces" or "It's not the same horse"

Table 4.

Frequencies and Percentages of Children's Puzzle Choices and Reasons

	Puzzle Choice #1	**Puzzle Choice #2**
Soluble	18 (60%)	17 (57%)
Insoluble	12 (40%)	13 (43%)
	Reason #1	**Reason #2**
Challenge	2 (7%)	2 (7%)
No Challenge	5 (17%)	6 (20%)
Like/Want	16 (53%)	16 (53%)
No Reason	3 (10%)	2 (7%)
Uncodeable	4 (13%)	3 (10%)

Table 5.

Examples and Frequencies of Children's Spontaneous Verbalizations during Testing

Utterance Category	**Example**	**Total # Utterances**	**# Children who uttered**
Performance Concern	"That's not a good one for me"	25	15 (50%)
Negative Self-Evaluation	"I can't do it"	20	10 (33%)
Disengaged	"Can I do a different one?"	10	7 (23%)
Strategy	"Maybe it goes in this one"	64	20 (67%)
Task Appropriate Difficulty	"I don't know where this goes"	75	21 (70%)
Task Appropriate Solution	"That one goes here!"	212	21 (70%)
Task Irrelevant	"I like starfish"	325	24 (80%)
Ambiguous	Most often non-words	7	4 (13%)

Table 6.

Description, Relevance, and Adaptation of Measures

Measure	Construct	Operationalization	Relevant Findings	Altered from Smiley & Dweck
Pretest time	Puzzle solving ability	Total time taken to complete pretest puzzle		
Emotion	Children's affect	3pt scale (happy, middle, sad)		□
# puzzle pieces	On task performance	Count of correct puzzle pieces inserted during insoluble puzzles		
Solution time difference	Performance decline	The difference between the time to finish the post-failure soluble puzzle and his or her time to finish the pre-failure soluble puzzle		
Good/Not so good	Children's assessment of their ability	"Are you good or not so good at puzzles?" asked before and after failure experience		
Expectancies	Task specific confidence	"If you worked on this puzzle all day, do you think you could finish?" asked after each insoluble puzzle	□	□
Puzzle choice	Achievement goal orientation (in conjunction with reasons)	"We get to do 2 more puzzles. Which puzzle would you like to do again?" asked (twice) following last soluble puzzle	□	
Reason for puzzle choice	Achievement goal orientation (in conjunction with choices)	"Why did you pick that puzzle to do?" asked following each puzzle choice	□	

Table 7.

Comparison of Children's Puzzle Choices and Reasons

	Puzzle Choice #1	
Reason #1	***Soluble***	***Insoluble***
Challenge	0	2 (7%)
No Challenge	4 (13%)	1 (3%)
Want/Like	12 (40%)	4 (13%)
No Reason	2 (7%)	1
Uncodeable	0	4 (13%)
	Puzzle Choice #2	
Reason #2		
Challenge	0	2 (7%)
No Challenge	5 (17%)	1 (3%)
Want/Like	10 (33%)	5 (17%)
No Reason	1 (3%)	2 (7%)
Uncodeable	2 (7%)	2 (7%)

Table 8.

Comparison of Children's Puzzle Choices and Reasons according to Feedback Condition

	Feedback Condition	
Puzzle Choice #1	***Effort***	***Ability***
Soluble	8 (53%)	10 (67%)
Insoluble	7 (47%)	5 (33%)
Reason #1		
Challenge	2 (13%)	0
No Challenge	0	5 (33%)
Want/Like	11 (73%)	5 (33%)
No Reason	1 (7%)	2 (13%)
Uncodeable	1 (7%)	3 (20%)
Puzzle Choice #2		
Soluble	7 (47%)	10 (67%)
Insoluble	8 (53%)	5 (33%)
Reason #2		
Challenge	2	0
No Challenge	1 (7%)	5 (33%)
Want/Like	9 (56%)	7 47%)
No Reason	2 (13%)	1 (7%)
Uncodeable	1 (7%)	2 (13%)

**Note: Percentages are out of N=15 as half the sample received effort feedback and half received ability feedback*

Table 9.

Comparison of Challenge and No Challenge groups with Children's Utterances

	Performance Concern	**Disengaged**	**Negative Self-Evaluation**	**Strategy**
Soluble, No Challenge (N=5)	3	5	1	17
Insoluble, Challenge (N=2)	1	0	0	4