UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

DO TEACHERS' BELIEFS ABOUT INTELLIGENCE AND FAILURE IMPACT STUDENTS' BELIEFS ABOUT INTELLIGENCE WHEN ACCOUNTING FOR PARENT INFLUENCE?

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

KRISTYNA LOONEY
Norman, Oklahoma
2019

DO TEACHERS' BELIEFS ABOUT INTELLIGENCE AND FAILURE IMPACT STUDENTS' BELIEFS ABOUT INTELLIGENCE WHEN ACCOUNTING FOR PARENT INFLUENCE?

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

BY

Dr. Teresa DeBacker, Chair

Dr. Sara Beach

Dr. Howard Crowson

Dr. Benjamin Heddy

Dr. Ji Hong

Table of Contents

List of Tables and Figures

Abstract

Children's beliefs about their intelligence (i.e., growth vs. fixed mindset) have been shown to strongly influence subsequent behaviors. Failure, and the beliefs one has when encountering failure, have only begun to be studied. Previous research argues that beliefs about failure in parents are more concrete to children, and thus, more prominent in shaping their beliefs about intelligence. This study utilized hierarchical linear modeling to explore how 87 4th and 5th-grade students' beliefs about intelligence were influenced by perceptions of parental implicit beliefs and parental perceptions of beliefs about failure as well as teacher beliefs about failure and implicit beliefs about intelligence. The low number of teacher participants did not allow for any exploration of a possible influence on student beliefs. Hierarchical linear modeling showed a significant interaction effect between children's perceptions of parental implicit beliefs and perceptions of parental beliefs about failure. This effect was further explored using simple slope analyses which showed that it is not enough for a parent to just be perceived as having a growth mindset, they must also be perceived as having a failure-is-enhancing mindset if they are to "lift" their children's beliefs towards a more incremental mindset.

Introduction

People, from the time they are born to the time they die, experience frustration, struggles, and failure, as these are universal experiences. However, people do vary in how they perceive, react, and allow these experiences to affect their lives. For example, a student in an undergraduate class may receive a failing grade on his/her first exam, feel hopeless and frustrated, and drop the course. On the other hand, a student in the same class may receive a similar grade and see the failure as a potential challenge, re-evaluate his/her study habits, form a study group with classmates, and consult with the professor on study strategies. As another example, two people may decide to start to eat a healthy diet to lose weight. After a week, both people may cave into temptation and eat the doughnuts sitting in the office break room, often seen as a failure. One person may tell himself there is no point in continuing the diet, order takeout and eat it in front of the T.V., believing that he is destined to be overweight. The other person may reflect on why she wanted the doughnut, cook a healthy dinner that night, and walk around the neighborhood while understanding that nobody is perfect and setbacks will happen.

Interestingly, a person's beliefs about failure may not be static throughout life, but open to change. The interactions we have with others, whether that be parents, teachers, or friends, may impact the way we view our abilities in many different areas of life. It may seem obvious that our parents or guardians remain the first interactions we have in our young lives. When we first begin to walk, talk, and explore the world, their reactions to our successes and failures may impact how we come to respond to failure (e.g., Haimovitz & Dweck, 2016). More specifically, an adult's beliefs about failure can be further delineated into two ends of a continuum. The failure-is-enhancing mindset is when the person believes that failure facilitates learning and growth, therefore an *enhancing* experience for the person. On the other hand, a failure-is-

debilitating mindset is when the person feels that failure inhibits learning and productivity or in other words, a *debilitating* experience (Haimovitz & Dweck, 2016). These beliefs about failure may influence a person's subsequent actions and the outcome when faced with a challenge.

Children spend many of their waking hours learning at school. Therefore, teachers may play a vital, and perhaps dominant, role in shaping students' beliefs about failure, abilities, and intelligence which may then determine subsequent actions in the classroom and their lives. Previous research has not yet sought to understand how these beliefs function, are nurtured by teachers, influenced by classroom context, and whether teachers, as well as parents, have an impact on children's beliefs. Teachers especially are in a unique position to influence the way a child views learning, given that children in Elementary school spend most of their time in a self-contained classroom, being taught by one teacher.

A number of studies indicate that the way adults, both parents and teachers, speak to children and teens about academic achievement can influence their beliefs about the nature of intelligence (e.g., Gunderson et al. 2013; Mueller & Dweck, 1998). Further, previous research has shown that the beliefs a teacher holds regarding intelligence as well as the goals they endorse (e.g., performance vs. mastery) influences subsequent assignments, activities, and feedback provided to students and may perpetuate a recursive cycle, thus influencing the students' beliefs either positively or negatively (Lee, 1996; Rattan, Good & Dweck, 2012). However, students are not accurate in identifying the beliefs and goals of the adults in their lives but tend to orient their beliefs more towards the perceptions they have of the adult's beliefs.

Recent research suggests that adults' beliefs about the nature of failure may be particularly salient to children (Haimovitz & Dweck, 2016). Given that previous research has shown that students lack accuracy in identifying the goals and beliefs that adults in their lives

endorse, the concrete nature of failure is of particular interest. Further, numerous studies have used a failure or challenge situation (e.g., failing test grade, challenging practice problems) to "bring to light" the beliefs and subsequent behavioral and motivational differences of participants. Until recently, researchers have not looked at failure as a separate construct that may be influencing other motivational variables and thus, impacting a person's behaviors and beliefs.

The purpose of the present study was to expand upon previous research by a) measuring teacher beliefs about failure and intelligence, b) measuring children's perceptions of parent beliefs about intelligence and failure and, c) determining whether perceptions of parental and teacher beliefs influence children's own beliefs. If children are not accurate in their perceptions of an adult's beliefs, either about intelligence or academic goals, then perhaps failure is, as previous researchers argue, more concrete, and thus, perceived more clearly by students. If beliefs about failure are more accurately perceived by students, these beliefs may have more of an influence on the students' beliefs than say, beliefs about intelligence.

The theoretical framework for this study is Albert Bandura's social cognitive theory which stresses the idea that a considerable amount of our learning occurs in a social environment (Shunk, 2012). Further, reciprocal interactions among personal, behavior, and social/environmental factors, the central belief of Bandura's theory, is especially pertinent to this research. How one interprets the effects of their actions influences and alters their environments as well as personal beliefs, which subsequently inform and changes future behaviors (Shunk, 2012). Given the multitude of interactions in the classroom, it can be reasoned that these interactions influence the way a student, and even the teacher, may view various traits. These interactions are dynamic and ever changing depending on the environment a student finds

him/herself in. The classroom is not a vacuum. Other people's beliefs, actions, and interactions cease to affect us at all. We can all remember a specific instance when a teacher (or adult) positively influenced us, perhaps shaking our very belief system about something. This interaction may cause us to make major changes in our lives (e.g., changing a major, trying out for the team). On the other hand, we all can remember a teacher (or adult) negatively affecting us as well, perhaps encouraging us to steer clear of a subject or opportunity because they were trying to "protect us". Those interactions influence how we view ourselves and our abilities, whether positively or negatively. If a student is constantly told, either implicitly or explicitly, that a subject is just not for them or are steered more towards Language Arts classes versus math and science, that student may start to internalize those beliefs. Those beliefs that are nurtured may then affect their lives well into the future. Do these beliefs of others have anything to do with what that student can actually do or accomplish? Of course not, but to that student, the beliefs others are either unknowingly or knowingly imparting on them may become "truth".

The research, as presented, will first discuss the beliefs that a person may hold, the impact these beliefs have on their lives, and the malleability of those beliefs. Next, achievement goals will be discussed to show the effect of a person's beliefs influencing concrete and observable actions (i.e., goals). Last, beliefs about failure will be discussed.

Theory of Implicit Beliefs

Throughout the process of learning, a person will struggle while experiencing failure, frustration, and doubt; this is a natural process for human beings. We learn, often through failure, how to make something great. However, not all people view failure as a learning opportunity. Some shy away from potential failure, believing that they will only demonstrate their inability or incompetence, perhaps setting up the maladaptive process of avoiding failure,

not learning from their mistakes, and fearing expanding their abilities. Others run towards the chance to fail, knowing they will gain a wealth of knowledge from it. What causes people to view the same situation in remarkably different ways? One factor is their implicit beliefs about the malleability or fixedness of human characteristics.

Implicit *theories*, or implicit *beliefs*, refer to a person's underlying beliefs about the nature of a human characteristic (Dweck & Leggett, 1988). Research on implicit theories in various domains (e.g., intelligence, personality, and health) has aimed to answer when these beliefs develop, why people hold vastly different beliefs in many areas of their lives, and how these beliefs influence their actions. Implicit beliefs are not solely situated in an educational context. These beliefs exist in varying domains outside of the classroom such as personality (e.g., Yeager et al., 2014), mental health in young children (e.g., Schleider, Abel, & Weisz, 2014), and second language acquisition (e.g., Lou & Noels, 2016).

Entity Versus Incremental Beliefs

Implicit beliefs are considered two extremes on a continuum (Dweck & Leggett, 1988). More specifically, incremental theories (in various domains) indicate a belief that human characteristics are malleable, able to change over time through effort and persistence of the individual. In contrast, entity theories refer to a belief that human characteristics are relatively fixed and unchangeable (Dweck & Leggett, 1988). The beliefs that one holds appear to influence subsequent behavior. If a person believes that they can change their abilities, the behavior they exhibit will be very different from someone who does not believe they can change their abilities. More specifically, if one believes that future effort is futile (e.g., fixed mindset), their behavior will mirror those beliefs. Further, these implicit beliefs are domain-specific, meaning that a person may have an entity belief in one domain but an incremental belief in

another (Dweck, Chiu & Hong, 1995). For example, an individual who holds an incremental belief about his/her abilities in English may believe that their abilities are fixed in math. Namely, that person may think that he/she is either a "math person" or not and that no matter how hard he/she tries, he/she will always have the same ability in that specific domain. On the other hand, a person may be able to work towards improving his/her abilities in English; it all depends on the effort that person puts into the subject.

Researchers are finding that implicit beliefs develop as young as kindergarten (Dweck, 1999) and may be influenced by parents (e.g., Haimovitz & Dweck, 2016) and teachers (e.g., Park, Gunderson, Tsukayama, Levine & Beilock, 2016). Studies regarding the impact parents have on their child's implicit beliefs have yielded inconsistent findings (e.g., Gunderson et al., 2013; Park et al., 2016). However, studies have found that parents' intelligence mindsets may be linked to other child outcomes such as persistence/learned helplessness (Jose & Bellamy, 2012) and academic and affective functioning (Pomerantz & Dong, 2006).

Fewer studies have looked at the influence that teachers' beliefs about intelligence have on their students. This focus is vital since educators are responsible for teaching our students not just content specific information but social and emotional skills as well.

Classroom Teachers and Implicit Beliefs

The views that teachers hold regarding the malleability of ability impact their classrooms in many ways and appear to influence the views their students adopt regarding ability (Stipek, Givvin, Salmon, & MacGyvers, 2001). Several studies will be discussed that demonstrate how teachers embed their beliefs into their teaching practices and interactions with students. Further, these beliefs are closely tied to the implementation of classroom goals. However, few studies have explicitly aimed to identify the various beliefs that teachers adopt regarding ability, and the

impact these beliefs have on their classroom practices and implicitly, their students. In the high-stakes, vulnerable, but hopefully uplifting context of a classroom, the teacher can exert a strong influence on how a student feels about their abilities both in a subject area as well as their abilities to succeed.

Lee (1996) surveyed Korean elementary teachers, 100 males, and 100 females, with a sample purposefully chosen with an even split between participants holding either an entity or incremental theory of intelligence. This study aimed to determine if teachers treated students differently depending on their implicit theories of intelligence and to replicate an unpublished study (Lee & Dweck, 1995 as cited in Lee, 1996). The authors measured implicit beliefs about intelligence and asked teachers to respond to a hypothetical situation by ranking the performance of a target student (low, average, and high scores), provide feedback to the student, and assign a follow-up assignment. Results show that there was no difference in how teachers initially scored students. However, many stark differences emerged following that preliminary assessment. First, there was a statistically significant difference in the type of feedback given by teachers, with those holding entity beliefs giving 62% ability-oriented feedback compared to effort feedback (38%). More specifically, teachers holding entity beliefs evaluated ability based on scores, gave direct answers when students were struggling, and commented on concrete things such as handwriting neatness or gave no feedback at all. In stark contrast, those holding more incremental beliefs emphasized effort, gave indirect clues when students were struggling, and provided encouragement.

Next, teachers were asked to give a follow-up assignment. Those holding entity theories of intelligence chose performance goals that would allow for an increase in scores or grades while teachers holding incremental beliefs chose assignments that would build students'

confidence, help them to develop problem-solving skills, and assist them to self-diagnose and self-regulate. More specifically, entity teachers responded with a negative bias to confirm their beliefs that a student only has limited potential and is unable to improve. Further, they gave lower grades to those they had low expectations for and higher grades for those they had high hopes for as well as ability-oriented feedback and performance-oriented assignments. In contrast, those having incremental theories of intelligence gave fair treatment to all students in the form of average scores, effort-oriented feedback, and mastery-oriented assignments. With those results taken together, Lee (1996) states that "as a result, vicious cycles are created and prophecies of teachers are self-fulfilled" (p.10). For example, a teacher who holds an entity theory of intelligence believes a student is not capable of succeeding and assigns that student a lower score on an assignment. Further, the teacher believes they scored low because they do not have the abilities, which causes the student to be adversely affected by the teacher's bias.

Considering the findings, several limitations of Lee ‘s (1996) study should be discussed. First, the participants in this study were Korean Elementary teachers so the findings may not be generalizable to the United States. Second, the teachers were presented with a hypothetical situation which may or may not accurately represent their actual teaching practices. Third, the average teaching experience for the sample was 20 years, which may not be representative of Elementary teachers in the United States.

In a sample taken from the United States, the previous findings were also seen. However, undergraduates were asked to imagine themselves as teachers (Rattan et al., 2012). The undergraduates, none of whom were pre-service teachers, were asked to imagine themselves as 7^{th}-grade math teachers meeting with students one-on-one following a score of 65% on a test. The undergraduates were asked how much they believed the student received that score because

he/she is not smart enough. The authors found the more participants endorsed an entity theory of intelligence, the more they agreed that this one instance of failure occurred because the student was not smart enough and lacked math intelligence.

In the next study, the authors sought to manipulate participants' implicit theories of intelligence in math to determine the impact they have on comfort strategies and pedagogical practices. They again recruited undergraduate students (none of whom were teachers) and asked them to read an article manipulating their implicit beliefs before being given the scenario from the first study. Results show that those in the entity theory condition were significantly more likely to endorse comfort-oriented strategies (e.g., consoling the student for their lack of ability) and subsequently using teaching strategies that undermine engagement and future achievement (e.g., assign less homework). The authors state that these findings support a causal role in the early diagnosis of ability as well as the following pedagogical choices that follow, supporting Lee's (1996) findings. To further expand their study, they next recruited graduate teaching assistants in math-related fields who then read a scenario similar to the previous two studies. Supporting the previous findings, the teaching assistants who endorsed an entity theory of intelligence believed that a large percentage of the student's failing grade was due to a lack of intelligence in math, expressed significantly lower expectations for future performance, and endorsed comforting and potentially unhelpful practices compared to those who endorsed an incremental theory.

Again, several limitations should be discussed regarding the previous study. First, only undergraduates were surveyed and asked to imagine themselves as teachers; the participants were not practicing teachers and not even education majors. This is a significant limitation since the findings are not generalizable to the larger population of practicing teachers. Second, the

subject area and grade are very specific which again, may not generalize to teachers in other subjects or grade levels. This is especially important when past studies have identified differences in teachers' implicit beliefs about intelligence depending on the subject they teach (e.g., Jonsson, Beach, Korp & Erlandson, 2012). Third, it may be argued that a score of 65% on a test may not be considered a significant enough failure (if a score of 70% is considered passing) to elicit strong feelings regarding abilities. Fourth, the manipulation aspect of the study was done with undergraduate teaching assistants, not currently practicing teachers. Given the differences between the daily responsibilities of a teaching assistant and a full-time teacher, more research must be done to see if these findings are seen in practicing teachers.

Park et al. (2016) surveyed elementary teachers and their students and found that teacher-reported instructional practices predicted children's implicit beliefs across the school year. More specifically, the more that a teacher reported emphasizing performance outcomes and identifying students who score well, the more students endorsed an entity theory of intelligence towards the end of the year. Interestingly, teachers' mastery-oriented instructional practices were not significantly related to children's implicit beliefs. Further supporting previous studies demonstrating that teachers' implicit beliefs influence pedagogical practices (e.g., Lee, 1996; Rattan et al., 2012), this study also found that teachers who endorsed an entity theory of intelligence were more likely to highlight performance outcomes and less likely to emphasize students' mastery.

Further supporting the previous studies, Stipek et al. (2001) surveyed 21 math teachers in the 4th and 6th grades on five dimensions of beliefs, and more specifically, their implicit beliefs about intelligence in math and performance goal orientation. The study found that those who supported more of an entity theory of math ability were significantly more likely to emphasize

performance in the classroom. Also, teachers who held more of an entity theory of ability created a classroom context where mistakes were something to be avoided.

Interestingly, considering the previously discussed findings, Gutshall (2016) surveyed seven teachers from one elementary and one middle school and 359 of their students to determine how accurately they perceived their teacher's beliefs about intelligence. Surprisingly, only 59.33% were accurate, with 68.24% believing their teacher had the same mindset as themselves when only 55.7% shared the same mindset as their teacher. However, teacher mindset accounted for only 2.1% of the variance in student mindset. Given these findings, it may be argued that the relationship between teacher and student mindset may be more complicated than first believed.

Several key findings from the previously discussed studies are worth noting. First, teachers who endorsed more of an entity theory of ability crafted a classroom that emphasized the avoidance of mistakes. Second, the more participants supported an entity theory of intelligence the more likely they were to comfort students for lack of ability and assign less homework. Third, teachers and participants endorsing an entity theory of intelligence and ability were much more focused on grades, scores, and performance goals. Fourth, teachers and participants endorsing an incremental theory emphasized effort and problem-solving skills. Moreover, and most importantly, a teacher's early diagnosis of ability (e.g., a student's test or assignment grade) influenced the teacher's subsequent pedagogical choices (e.g., type of follow-up assignment and type of feedback). Given these findings, teachers holding an entity belief in intelligence and/or ability may be perpetuating a recursive cycle for the student and ultimately be influencing their beliefs about their intelligence or abilities.

The vast majority of empirical studies focusing on implicit beliefs thus far discuss failure situations or scenarios as the critical turning point for a person, and the moment when their beliefs become apparent. At this time, we have a choice: put forth more effort or give up. This moment is the fork in the road, so to speak, that causes the differing behavior and beliefs that have been discussed thus far.

Achievement Goal Theory

Given previous research on the impact of implicit beliefs, and the argument that Dweck and Leggett (1988) present that one's beliefs point people towards specific goals, the next section will provide an overview of achievement goal theory followed by the impact that classroom goals have on students.

Brief Overview

In the mid-1980's, Achievement Goal Theory began to distinguish between mastery goals (also known as learning goals) and performance goals to understand students' adaptive and maladaptive responses to challenges. Dweck and Leggett (1988) found that those adaptive and maladaptive responses were categorized by different characteristics and further inquired as to why individuals, who scored similarly on tasks, showed very different responses when faced with challenges. To explain this occurrence, Dweck and Leggett (1988) began focusing on the conceptualization of goals and how those goals individuals pursue then create the framework within which they interpret and respond to the events in their lives. Further, Dweck and Leggett (1988) delineated their conceptualization by identifying two classes of goals. First, performance goals lead individuals to be concerned with outperforming others, gaining positive judgments regarding their competence, and/or avoiding negative judgments. Second, mastery goals are

when people are concerned with increasing their competence. This belief became the foundation for the dichotomous perspective of achievement goals.

Elliot (1999) furthered the theory by discussing approach and avoidance as a function of valence. Goals were not only a part of how competence is defined, but positive/negative events play an influential part as well. A positive or desirable occasion or possibility prompts approach motivation. For example, a student has previously scored well on essay tests and is excited for the essay test which will allow him/her to demonstrate his/her skills. In avoidance motivation, the behavior is prompted by a negative or undesirable event or chance. For example, a student has previously failed his/her math tests and fakes being sick to avoid taking the test. Elliot (1999) proposed the trichotomous framework that includes mastery goals (developing competence), performance-approach goals (achieving normative competence), and performance-avoidance goals (avoiding normative incompetence).

Classroom Teachers and Achievement Goals

Research on classroom teachers and achievement goals spans more than thirty years and covers a broad range of ages, subjects, demographics, and contexts to show that teachers impact students in many ways. Church, Elliot, and Gable (2001) state that "the classroom environment [exerts] an indirect, distal effect on achievement outcomes by their influence on achievement goal adoption; achievement goals, in turn, are presumed to be direct, proximal predictors of achievement outcomes (p.44). Classroom goal orientations refer to the types of goals that a teacher endorses either implicitly or explicitly and are most often measured on a mastery-oriented or performance-oriented scale. More specifically, a task goal structure emphasizes mistakes as part of the learning process, nurtures and values effort and improvement, provides work that is challenging and creative, and promotes the belief that learning is something to be

relished (Urdan, Midgley & Anderman, 1998). On the other hand, an ability goal structure classroom discusses the importance of grades and test scores, frequently compares students against each other and considers competition as normal (Urdan et al., 1998). Stipek et al. (2001) found that teachers' beliefs, which were assessed at the beginning and end of the year, were relatively consistent, which may help students pick up on, and adopt, the goals their teachers exhibit in the classroom.

As far back as the 1980's, researchers have studied how a mastery or performance goal orientation in the classroom may impact students' way of thinking. It is important to note that students' perceptions of classroom goal structures, not necessarily teacher reported or observed classroom goal structures, remain predictive of the types of personal goals students adopt. However, there is considerable inconsistency (5-35%) in the amount of variance found in students' goal structure perceptions that is related to classroom differences (Meece, Anderman & Anderman, 2006).

Research has found that being in classrooms where a mastery goal orientation was perceived increases the likelihood that students will pursue tasks that promote improvements in knowledge, use more effective learning strategies, prefer tasks that offer a challenge, enjoy the class more, and believe that effort and success are related (Ames & Archer, 1988). Further, mastery goals were found to be positively related to low disruptive behavior (Kaplan, Gheen & Midgley, 2002), self-efficacy (belief in one's ability to succeed), and use of positive coping strategies, and negatively related to use of denial and projective coping strategies (Friedel, Cortina, Turner & Midgley, 2007).

In contrast, classrooms where a performance goal orientation was perceived showed students who were more likely to focus on their ability, judge their ability to be lower, and blame

their ability as the cause of failure, thus demonstrating maladaptive strategies (Ames & Archer, 1988) as well as self-handicapping strategies (Urdan et al., 1998) and an increase in disruptive behavior (Kaplan et al., 2002). Further, students were less likely to engage in corrective strategies following struggles, more liable to make negative self-judgments, and more likely to deny the situation or project blame for the difficulty they experienced onto the teacher (Friedel et al., 2007).

Somewhat surprising, however, given the findings, is that teachers rarely discuss motivational goals explicitly in the classroom, do not present consistent motivational messages to their students, and students' perceptions of these messages can vary widely within classrooms (Urdan, 2004). Further, students may also perceive the promotion of several goals, causing them to integrate the contradictory messages by pursuing multiple goals simultaneously (Schwinger & Stiensmeier-Pelster, 2011).

Students are influenced by their environment in some way, but what specific behaviors are they noticing and paying attention to? Perhaps goals, if not explicitly discussed, are not salient enough for students to fully attend to. Which begs the question: is anything being consistently perceived by students as well as impacting their beliefs?

Beliefs about Failure

After discussing the research on implicit beliefs and the impact these beliefs have on many areas of an individual's life, one commonality appears. When researchers aim to provoke a participant's implicit beliefs, academic goals, and subsequent decisions (e.g., keep trying or give up), they present that person with a failure scenario. Often, this takes the form of an academic failure (e.g., failing test grade or challenging math problems). These situations force the participant to react to the failure, causing differences in behavior and beliefs to emerge. For

example, Dweck and Leggett (1988) and Diener and Dweck (1978, 1980) studied the responses of late, grade-school-aged children's helpless or mastery-oriented patterns. Interestingly, no difference was found during the successful problems. All participants showed effective problem-solving strategies. However, a significant difference among students emerged following the challenging problems. More specifically, the students who demonstrated helpless patterns displayed a dislike and boredom for the task, felt anxiety over their performance, and attempted to divert attention away from their failures. Interestingly, the mastery-oriented students did not view the failure as suggestive of a lack of ability; they redoubled their efforts and employed more extensive strategies. Similarly, Hong, Chiu, Dweck, Lin, and Wan (1999) found that while giving negative feedback to students, entity theorists were less likely to make effort attributions compared to incremental theorists. In other words, entity theorists, similar to Dweck and Leggett (1988) and Diener and Dweck (1978, 1980), were less likely to take remedial action and more likely to adopt defensive behavior, compared to incremental theorists. The authors emphasize the similar finding that differences only emerged following feedback that was negative. Past research on self-handicapping may also support research on this construct as well (e.g., Ommundsen, Haugen, & Lund, 2005; Urdan et al., 1998; De Castella, Byrne & Covington, 2013). For example, when an individual engages in self-handicapping, they are trying to create a justification, outside of themselves and their ability, for any potential failure. It is this fear of failure, and a desire to avoid failure suggesting a lack of ability, that results in maladaptive behavior.

It may then be suggested that it is these students' beliefs about failure that impact their actions, perhaps as much as or more, than whether they are helpless or mastery-oriented. The conclusions and beliefs that the students have regarding failure appear to motivate their

subsequent actions. Interestingly, failure mindset was not explicitly studied as a distinct construct in educational research until Haimovitz and Dweck (2016) surveyed affluent parents in the San Francisco Bay area regarding whether they held failure-is-debilitating or failure-is-enhancing mindsets. Four studies were conducted to test whether parents' intelligence mindsets, failure mindsets, and perceptions of their child's competence in school were related to their child's beliefs about intelligence. Surprisingly, parent's intelligence mindsets were not significantly related to their children's intelligence mindsets, but their failure mindsets were. Parents who had a more failure-is-debilitating mindset had children who were significantly more likely to hold an entity theory of intelligence. Further, parents with a failure-is-debilitating mindset were more likely to be concerned with their child's performance and lack of ability and less likely to support their child in their future learning after reacting to a scenario of their child coming home with a failing grade. Also, children were able to accurately perceive their parent's failure mindsets but not their intelligence mindsets. Lastly, the authors manipulated parents' failure mindsets by assigning them one of two biased questionnaires and found parents in the failure-is-enhancing condition reported more of a failure-is-enhancing mindset than did parents in the failure-is-debilitating condition. Further, even when the authors controlled for parents' perceptions of their child's competence in school, the failure mindset condition still predicted whether they would respond to their children in a performance-oriented or mastery-oriented way following a failure their child experienced.

Nonetheless, given past research being unable to reliably show that parent's beliefs about intelligence were related to their child's intelligence mindset, the findings from this set of studies are promising. The argument by Haimovitz and Dweck (2016) that beliefs about failure are more concrete, and thus, easier for children to perceive, has implications for educators and

parents. Interestingly, educational psychologists are not the first to discuss the importance of beliefs about failure. For example, Sitkin (1992) argued that failure is a vital prerequisite for effective organizational learning and adaptation. Further, he discussed three "liabilities of success" as complacency, restricted search and low levels of attention, and homogeneity. For example, people, or organizations, under successful conditions, often resist trying new ways of doing things when something has been working for them (complacency). Also, small wins/positive feedback are unlikely to draw attention to problems or opportunities for learning (low levels of attention). Further, when people are successful, they tend not to deviate from what is working (homogeneity). Sitkin (1992) argues that these liabilities foster reliability, not resiliency.

On the other hand, there remain numerous benefits to failing, or more specifically, what he refers to as "intelligent failure." For example, failure requires deeper processing, motivates the person to adapt, induces experimentation, and fosters additional variety. This argument, that failure requires a person to stop, re-evaluate, and re-plan, is also supported in cognition research. More specifically, VanLehn, Siler, Murray, Yamauchi, and Baggett (2003) discuss, what they call "impasses" when characterizing the differences between successful and unsuccessful learning opportunities. An impasse occurs when a student realizes he/she lacks a complete understanding of something, whether that be a math formula, how to write a five-paragraph essay, or how to cite references in a research paper. The student may get stuck, realize he/she came to an incorrect conclusion or may be uncertain about what to do next. This impasse then motivates the student to take an active role in better understanding what it is that is confusing them. When compared to a nonimpasse (no errors, a correct answer, a guess, or someone else answers), the authors found that impasses increase the likelihood of learning. Further, VanLehn

et al. (2003) argue that an optimal tutoring strategy would be to let the student reach an impasse, thus promoting more active learning. Similarly, Kapur (2014) also supported the need to fail, more specifically "productive failure," in that students are allowed and encouraged to struggle and fail during ill-structured problems in the classroom. This struggle, which could also be seen as an "impasse," requires students to engage in deeper, more active learning processes, experiment with solutions, and encourages variety in approaches to solving the problem. Taken together, the research in many domains appears to all support the need for failure, and not just failure, but productive or intelligent failure.

Failure, in education literature, is not a new concept. However, it appears to be in the background of research, a sort of prelude to what is being studied or the spark that ignites an intended behavior in a person. But what if failure remains an impactful element in a person's decisions? More specifically, Dweck et al. (1995) reasoned that implicit beliefs are linked to attributions and goals, even going so far as to call them "allied structures" (p. 324), arguing that the impact of implicit beliefs comes from these links. Given the necessity of a failure situation in bringing to light a person's beliefs, it would be logical to reason that beliefs about failure should be included in these "allied structures" that influence the way a person thinks about abilities. If failure is the moment when the differences in people begin to show, why has failure itself not been explicitly studied in education? If a failure situation pushes a person to resort to self-handicapping or enjoy a challenging situation, more information is needed to determine what it may be about failure itself that causes these vast differences.

Institutions are seeing the far-reaching adverse effects of failure on more and more students. Faculty at Stanford and Harvard have even created the term "failure deprived" to describe the students that they see who are unable to cope with simple struggles, with some even

resorting to suicide. A recent article written by Jessica Bennett in The New York Times titled "On Campus, Failure is on the Syllabus" highlights the impact of failure on students who appear to not have experience with it. Several institutions, including Stanford, Cornell, Smith College, and Harvard, are creating programs to address the growing negative impact of failure on students. By highlighting the widespread occurrence of failure through various modes (e.g., discussing first-hand accounts of failing and creating apps), campuses hope to address the fact that students do not "know how to fail" and aim to "normalize struggle." If a student is not allowed to fail, they will not develop the ability to move past it, learn from it, and become better.

To better understand how beliefs about failure develop and are nurtured by one's surroundings, research must try and identify specific aspects of a person's life that influences these beliefs. Further, it begs to be argued that determining how these beliefs are developed at a young age would be even more beneficial. Given the possibilities demonstrated in intervention research, we may be able to intervene when students are still young, before the effects of negative beliefs can impact their educational and personal decisions. Identifying the beginning stages of these beliefs, and addressing any maladaptive behaviors or beliefs, would be extremely beneficial at a younger age.

The Universities attempting to de-stigmatize failure are trying to change a lifelong pattern of behaviors and beliefs, which, admirable as it is, could be an uphill battle. The education system teaching our youngest students may greatly benefit from an increase in understanding regarding these beliefs so that they may be in a better position to address negative, self-destructive thoughts and behaviors. Teachers especially are in a unique position to influence the way a child views the process of learning. More specifically, children in Elementary school spend most their time at school, in a self-contained classroom, being taught all core subjects by

one teacher. Their teachers may moderate the way the students view learning and, more importantly, failure, which may have lifelong implications.

Significance of the Study

There is limited research in the area of a person's views of failure and how these beliefs translate into concrete actions taken by an adult when interacting with a child. The only research thus far by Haimovitz and Dweck (2016) did not find any significant relationship between parental self-reports of beliefs about failure and their self-reported intelligence mindsets (see Study 3a, p. 6). Given the suggestion that beliefs about failure are conceptually different from beliefs about intelligence, more research is needed to determine if these findings can be replicated in different populations.

The intriguing findings by Haimovitz and Dweck (2016) showing that a parent's failure mindset, not their intelligence mindset, was significantly related to their children's intelligence mindset leave many questions unanswered. First, there is only this one set of studies, all produced from the same lab, on the failure mindset construct. This study, in part, addresses the need for replication. Second, the sampling methods utilized by Haimovitz and Dweck (2016) did not result in samples that appear representative of the general population. For example, Study 1 sampled parents and children from the San Francisco Bay area in which 95.8% had at least a college degree. The extremely educated population originally surveyed by Haimovitz and Dweck (2016) may have influenced their results. In this study, participants were recruited from a public and a private school from the Oklahoma City area, which may better represent the demographics of elementary school children around the United States.

If parental beliefs about failure impact a child's implicit beliefs of intelligence more than parental implicit beliefs of intelligence (Haimovitz & Dweck, 2016), this area of inquiry must

also be explored in more detail. Considering that research on this theory is scant, possibly due to the complicated nature of the environment of a child, it is vital to identify any relationship between elements in the child's environment and the child's view of intelligence. Given the amount of time that a child spends at school, the multitude of research on the impact of implicit beliefs on various outcomes (e.g., Yeager et al., 2014; Schleider et al., 2014; Lou & Noels, 2016) and the effect of teachers' beliefs on students and classroom goal structures (Lee, 1996; Stipek, 2001) it is imperative to determine if a relationship is present between the view a teacher holds regarding failure and a child's view of intelligence. The results of this study will help shape future research focusing on the manifestation of these beliefs in children and how they are influenced by the adults around them.

Considering past research that is unable to consistently identify how a teacher's beliefs influence students in the classroom, failure mindsets may help further understanding of the dynamic interplay between teacher and student. If Haimovitz and Dweck (2016) are correct that failure is more salient to children, failure situations may manifest themselves in classrooms where struggles and failure are part of the learning process. Students may pick up on these behaviors more so than intelligence beliefs, as past research shows they frequently are incorrect (Gutshall, 2016).

Research Purpose and Research Questions

The present study expanded upon previous research by Haimovitz and Dweck (2016), more specifically, Studies 1, 3a, and 3b. Those studies found that parents' beliefs about failure predicted children's intelligence mindsets, children could accurately perceive their parents' beliefs about failure (but not their intelligence mindsets), and children's perceptions of their parents' beliefs about failure predicted their intelligence mindsets.

This is the only known set of studies (Haimovitz & Dweck, 2016) that explicitly measured beliefs about failure in parents. Further, these studies looked at whether any connections were found between beliefs about failure in parents, beliefs about intelligence in their children, and whether children can identify their parents' beliefs about failure and intelligence. This study aimed to explore teachers' beliefs about failure and how their students are influenced by their beliefs to further expand our understanding of the influences on children's beliefs about intelligence. Also, this study aimed to look at the moderating influence of parent and teacher's beliefs on the child's beliefs.

Research Questions

This study addressed the following questions:

1. Is there a relationship between a teacher's beliefs about intelligence and failure and his/her students' beliefs about intelligence?
2. Do teachers' beliefs about failure and intelligence moderate the influence of students' perceptions of their parents' beliefs about failure on the students' beliefs about intelligence?

Hypotheses

Based on the review of the literature, the following hypotheses were proposed:

1. Is there a relationship between a teacher's beliefs about intelligence and failure and his/her students' beliefs about intelligence?

It was hypothesized that teacher's beliefs about intelligence will not be significantly related to their student's beliefs about intelligence (Haimovitz & Dweck, 2016; Gutshall, 2016) but teacher's beliefs about failure will be significantly related to their students' beliefs about

intelligence (Haimovitz & Dweck, 2016). Previous research by Haimovitz and Dweck (2016) has shown that children are able to more accurately identify their parents' failure mindsets, not their beliefs about intelligence, which the authors argued was possibly due to beliefs about failure in parents being more concrete.

2. How do teachers' beliefs about failure and intelligence moderate the influence of children's perceptions of their parents' beliefs about failure on the students' beliefs about intelligence?

It was hypothesized that teachers' beliefs about failure and intelligence will moderate the influence of children's perceptions of their parents' beliefs about failure on the students' beliefs about intelligence. Past research supports this hypothesis in three ways: a) beliefs about academic abilities are influenced by social-contextual factors (e.g., Dweck & Leggett, 1988), b) intervention research has shown that implicit beliefs can be changed (e.g., Blackwell, Trzesniewski & Dweck, 2007; Lin-Siegler, Ahn, Chen, Fang & Luna-Lucero, 2016), and c) there is a positive correlation between classroom goal structures and students' personal goals in the classroom (e.g., Anderman & Midgley, 1997). Given the close nature of a classroom and the time spent by each student learning, struggling, and succeeding in close proximity with their teacher, the social-contextual factors of that teacher's beliefs influencing the classroom can not be refuted. Previous research has shown that a teacher's beliefs influence the pedagogical decisions they make in their classrooms which can then influence the beliefs of his/her students. Further, intervention research has shown that the beliefs one holds can be changed, either more towards a fixed mindset or gowth, oftentimes with something as simple as reading a scientific article in one sitting. It can be reasoned then that if students are attending class five days a week,

that the teacher's beliefs about intelligence could influence the students' own beliefs about their intelligence over time.

Method

This study utilized self-report surveys to examine the influence of teacher's beliefs about intelligence and failure on students' beliefs about intelligence while accounting for parent's beliefs about failure and intelligence.

Participants

This study invited elementary school teachers in 4th and 5th grades and their students in the Oklahoma City area to participate. Teachers from a public elementary school and a private school agreed to participate in this research. The public school is approximately 17% African American, 14% Hispanic, 8% Asian, 8% two or more races, 3% American Indian/Alaska Native, and less than 1% Hawaiian Native/Pacific Islander. Approximately 73% of students are from low-income families, 48% are female, and 52% male. Six teachers provided consent while parental consent and student assent of 51 students were obtained from this school.

The private school has approximately 10% non-white students (personal communication, March 6, 2019). This was all the information provided as these demographics are not publicly available. Three teachers provided consent while parental consent and student assent for 36 students were obtained from this school.

There were 9 teachers and 87 students who participated in this study. All 9 teachers were female with an average age of 38. Seven of the teachers were white, one American Indian/Alaska Native, and one preferred not to answer. Seven of the teachers hold a bachelor's degree and two hold a graduate or professional degree. Classroom participation for each teacher ranged from 7 to 15 students.

Measures – Teachers

Failure Mindset. The notion of failure mindset was first created by Haimovitz and Dweck (2016). Teachers' failure mind-sets were assessed with six items from Haimovitz and Dweck (2016) that include such statements as "Experiencing failure facilitates learning and growth," "Experiencing failure debilitates my performance and productivity," and "The effects of failure are negative and should be avoided" (p.3). Items were reverse-coded and averaged, with higher scores indicating more of an enhancing view of failure. Principal component analysis revealed that 62% of the variance could be explained by one factor, which all items loaded onto (Haimovitz & Dweck, 2016). The 6-point Likert-type scale has a reliable internal structure (Cronbach's $\alpha = .88$) and is distinct from other related constructs, such as intelligence mind-sets (Haimovitz & Dweck, 2016). Across the four studies in which Haimovitz and Dweck (2016) surveyed parents using this measure, Cronbach's α values ranged from .88, .82, .78, .81, and .79. Values over .70 are considered acceptable (Tavakol & Dennick, 2011). For the current sample, this measure had reliable internal structure for teacher's beliefs about failure (Cronbach's $\alpha = .91$).

Theories of Intelligence. Teachers completed the 6-point Likert type scale "Theories of Intelligence Scale-Self-Form for Adults" from Dweck (1999) that included such items as "You have a certain amount of intelligence, and you can't really do much to change it" and "You can change even your basic intelligence level considerably" (p. 178). Items were reverse-coded and averaged, with higher scores indicating stronger endorsement of an incremental theory or growth mindset. The scale has been widely used in many forms, and past studies have found acceptable Cronbach's α's of .78 for 7th-grade students (Blackwell et al., 2007) and .82 and .84 for 9th and 10th-grade students (Lin-Siegler et al., 2016). Past studies have found a 2-week test-retest

reliability of .77 for 7th-grade students (Blackwell et al., 2007). This measure had reliable internal structure for teacher's implicit beliefs in the current study (Cronbach's α = .91).

The entire survey for teachers is provided in Appendix A.

Measures – Children

Beliefs About Intelligence. Children completed a three-item variant of the adult survey (Dweck, 1999) measuring beliefs about intelligence which uses the term smart instead of intelligent (Cain & Dweck, 1995) to simplify the vocabulary for younger children. This survey includes such items as "How smart you are is something about you that you can't change very much." Items were reverse-coded and averaged, with higher scores indicating stronger endorsement of an incremental theory or growth mindset. Internal consistency (Cronbach's α) was found to be .77 for 4th and 5th-grade students (Haimovitz & Dweck, 2016). This measure had reliable internal structure for children's beliefs about intelligence in the current sample (Cronbach's α = .71).

Distraction Activity. Children were asked to complete one short distraction activity that included a drawing activity titled "Who's in the Ocean" and asked students to use their imagination to color/draw in anything that may be in the ocean. This activity was included between the two question sets to encourage more accurate responses when answering the survey items. More specifically, if children were first asked about their parent's beliefs, this may have influenced the way they responded to the survey items regarding their own beliefs. This may then have resulted in them answering closer to the adult's beliefs than what they believe. The short activity took approximately five minutes and was meant to be fun, a distraction from the previous survey items, and a quick mental break before moving on to the next set of survey items.

Perceptions of Parent's Beliefs. Children then completed a seven-item survey first introduced by Haimovitz and Dweck (2016) to determine their perceptions of their parent's beliefs about intelligence and beliefs about failure. First, a four-item, 6-point Likert sub-scale to assess their perceptions of their parents' beliefs about failure included items such as "My parent thinks failure is bad and should be avoided," and "My parent thinks failure can help me grow". Second, a three-item, 6-point Likert sub-scale to assess student's perceptions of their parents' beliefs about intelligence included items such as "My parent/guardian thinks you can learn new things but you can't change how smart you really are" and "My parent/guardian thinks you can always change how smart you are" (Haimovitz & Dweck, 2016). Items were reverse-coded and averaged, with higher scores indicating more of an enhancing view of failure. Haimovitz and Dweck (2016) found an internal reliability of .77 for 4th and 5th-grade students. In the current sample, this measure had reliable internal structure (Cronbach's α =.80) for children's perceptions of parental beliefs about failure but failed to reach the threshold generally considered acceptable (Cronbach's α = .66) for children's perceptions of parental beliefs about intelligence if considering values over .70 to be acceptable (Tavakol & Dennick, 2011).

The entire survey for children is provided in Appendix B.

Procedures

Teachers at the public school were recruited through face-to-face meetings that the researcher attended during a regularly scheduled staff meeting. Teachers were asked for their cooperation in completing the survey regarding their beliefs, distributing the parent consent form, and administering the student surveys in their classrooms. A sign-up sheet asking for email addresses and names was distributed so follow up information (e.g., online survey link)

could be sent. Those who agreed to participate were sent the online survey via email. Surveys took no more than ten minutes to complete.

Teachers at the private school were recruited through an email written by the researcher and distributed by the principals at each campus. Teachers were asked for their cooperation in completing the survey regarding their beliefs, distributing the parent consent form, and administering the student surveys in their classrooms. Teachers who completed the online survey were provided subsequent study materials in the same way as the public-school teachers.

Parents were informed of the study through a consent form that was provided in their child's weekly folder that was sent home. Parents were asked to provide consent to allow their child (or children) to participate in the study. Parental consent forms were collected by teachers and the researcher picked up the collected consent forms approximately one week later. Students who did not return a consent form were considered as not having parental consent.

Surveys for children were delivered to the schools by the researcher. Each teacher was provided with one sealed envelope that included written directions for teachers, oral directions to be read to students, and the survey materials. The teacher was instructed to administer surveys to students at a convenient time during regular school hours during the following week. Children provided their assent to participate in the study before completing the survey. Children were informed that the information they provided would be confidential and would not be shared with anyone. The survey took students approximately twenty minutes to complete.

On the day of survey administration, teachers were asked to pass out surveys to students. Those students whose parents did provide consent were given a packet containing the student assent form, one page of survey questions followed by the distraction activity, and another two

pages of survey questions. Students whose parents did not provide consent or did not return the parental consent form were given three pages of fun drawing activities.

Next, teachers asked students to read the student assent letter and sign if they agreed to be in the research project. Those students who did not want to participate were advised to skip to the distraction activity. Teachers then instructed students to circle one number that shows how much they agree or disagree with the statements. Students were assured that there were no right or wrong answers and to ask questions at any time. Teachers were asked to observe students as they completed the first three items and moved on to the distraction activity. Once the majority of the class was on the distraction activity, teachers were instructed to allow approximately five minutes before asking students to move on to the last page of survey items.

Teachers were asked to instruct students to place their finished surveys in the envelope once they were finished. Teachers were asked to re-seal the envelope and return the surveys to a designated area in the office once they were finished where they were collected by the researcher.

Data Analysis

To analyze the data, the following steps were taken. First, survey items, when necessary, were reverse coded, averaged, and basic descriptive statistics were calculated as well as reliability coefficients (e.g., Cronbach's α, reported earlier). Higher scores indicated more of an endorsement of an incremental belief about intelligence (growth mindset) and an enhancing view of failure while lower scores indicated more of an endorsement of an entity belief about intelligence (fixed mindset) and a debilitating view of failure.

To answer the research questions, hierarchical linear modeling (HLM) in SPSS Version 25 was used to analyze the variance in the outcome variable (implicit beliefs about intelligence

in students) when the predictor variables are at varying hierarchical levels (e.g., parent and teacher). Level 1 predictors (within a two-level model) are used to predict variation in the Level 1 outcome variable (the primary dependent variable), whereas Level 2 predictors are used to predict variation in intercepts (i.e., conditional means) and/or slopes across the level 2 units. HLM is an ideal means for analyzing nested data, in this case, students nested within classrooms, while dealing with the problems associated with non-independent observations. Typically, HLM begins by testing a null (or random-intercept) model to address the question of whether there is significant variation in the outcome variable across higher-level units and whether there may be problems with lack of independence in observations (Heck, Thomas, & Tabata, 2014). A statistically significant variance component for the random intercepts and/or a high intraclass correlation for this analysis would signal evidence that the observations within groups are non-independent.

The nesting aspect of the data requires the use of HLM in order to avoid Type-1 Errors, or "false positives," when students share the same environment (Peugh, 2010) as this violates the independence assumption required by traditional analyses (e.g., ANOVA). Knowing this is important since non-trivial amounts of dependence in the outcome variable results in biased standard errors and can seriously inflate the likelihood of Type 1 error when testing regression parameters (Heck & Thomas, 2015; see also Stevens, 2002).

Assuming evidence of non-independent observations based on the null model, then HLM analyses generally proceeds with the inclusion of predictors at different levels. Given the small number of Level 2 units (i.e., teachers/classrooms), model parameters were estimated using Restricted Maximum Likelihood Estimation (REML; see Heck et al., 2014, for discussion; Hayes, 2006).

Results

The following variables were used in subsequent analyses (See Tables 1-7 for descriptive statistics and correlations):

- Outcome: Student implicit beliefs about intelligence
- Level-1 Predictors: Children's perceptions of parental beliefs about intelligence and children's perceptions of parental beliefs about failure
- Level-2 Predictors: Teacher implicit beliefs about intelligence and teacher's beliefs about failure.

Table 1
Basic Descriptive Statistics

	N	Minimum	Maximum	Mean	Standard Deviation
Student Implicit Beliefs	87	1.00	6.00	4.33	1.25
Perceptions of Parent Implicit Beliefs	87	1.33	6.00	4.77	1.04
Perceptions of Parent Failure Beliefs	87	1.00	6.00	4.26	1.11

Table 2
Student Implicit Beliefs by Classroom

Classroom	N	Minimum	Maximum	Mean	Standard Deviation
1	8	3.67	6.00	4.58	.792
2	13	2.00	5.67	4.51	1.06
3	15	2.00	4.67	3.76	.821
4	9	3.00	6.00	4.82	1.23
5	10	2.00	6.00	5.07	1.26
6	10	2.00	6.00	4.10	1.24
7	7	1.00	6.00	3.05	2.01
8	7	3.33	6.00	4.62	.911
9	8	2.67	6.00	4.54	1.32

Table 3
Children's Perceptions of Parental Beliefs about Failure by Classroom

Classroom	N	Minimum	Maximum	Mean	Standard Deviation
1	8	3.75	5.50	4.56	.563
2	13	1.75	5.75	4.58	1.05

3	15	3.50	5.50	4.38	.542
4	9	1.75	5.75	4.17	1.28
5	10	3.75	5.50	4.88	.543
6	10	1.00	5.00	3.40	1.12
7	7	1.00	5.25	3.57	1.46
8	7	1.75	5.50	3.96	1.37
9	8	1.00	6.00	4.47	1.61

Table 4
Children's Perceptions of Parental Implicit Beliefs by Classroom

Classroom	N	Minimum	Maximum	Mean	Standard Deviation
1	8	4.00	5.67	4.88	.641
2	13	2.33	5.67	4.79	.908
3	15	2.67	6.00	4.44	.833
4	9	4.00	6.00	5.26	.741
5	10	4.00	6.00	5.33	.667
6	10	2.67	6.00	4.47	1.33
7	7	2.67	5.67	4.29	1.15
8	7	1.33	6.00	4.71	1.53
9	8	1.67	6.00	4.79	1.44

Table 5
Descriptive Statistics for Teachers

	Minimum	Maximum	Mean	Standard Deviation
Teacher Beliefs about Failure	3.50	6.00	4.63	.794
Teacher Implicit Beliefs	3.88	5.63	4.58	.628

Table 6
Means by Teacher

Teacher	Beliefs about Failure	Beliefs about Intelligence
1	4.83	5.63
2	4.67	4.25
3	5.17	4.50
4	3.83	5.38
5	5.17	4.25
6	4.67	4.13
7	3.50	3.88
8	3.83	4.13

9	6.00	5.13

Table 7
Correlations for All Variables

Variable	Correlations				
	1	2	3	4	5
1.Children's Implicit Beliefs	-	.621**	.494**	.174	.095
Perceptions of parent:					
2.Implicit Beliefs		-	.348**	.138	.022
3.Beliefs about Failure			-	.142	.225*
Teacher:					
4.Implicit Beliefs				-	.221*
5.Beliefs about Failure					-

*p < .05. ** p < . 01

First, a null model with no predictors, or random intercept-only model, was run (See Table 8). This model tested whether there was significant variation across groups (i.e., classrooms), or whether the intercepts randomly varied between groups (Hayes, 2006). Variation at Level-1 (i.e., student implicit beliefs) was significant (p < .001), indicating that there was more variation to be explained within classrooms (i.e., student level), but not significant at Level-2 (p = .136) indicating that there was not more variation to be explained across classrooms (i.e., teacher level). Given the low number of teachers who participated and the lack of significance across classrooms, subsequent analyses on Level-2 variables were done only for study completeness.

Table 8
Covariance Parameters for Null Model

Parameter	Variance Components	Standard Error	Wald Z	p value
Level-1	1.34	.225	6.23	<.001
Level-2	.200	.181	1.10	.136

The estimated variance component was not statistically significant ($\widehat{\sigma^2} = .200, p = .068$; one-tailed) in the model, suggesting no significant variation in mean intelligence beliefs across

classrooms. Nevertheless, the intra-class correlation (ICC computed as a ratio of the Level 2 variance component to the sum of Level 1 and Level 2 variance components) indicated substantial non-independence [.200/(.200+1.34) = .200/1.54 = .129] in the observations at Level 1. The ICC shows the percent of student implicit beliefs about intelligence variance that occurred across classrooms. This estimates the degree of non-independence in the outcome variable (i.e., students' implicit beliefs about intelligence) across Level-1 units. We can say that approximately 12.9% of the total variation in student implicit beliefs about intelligence occurs between groups/classrooms. Further, if the ICC is low, or close to zero, it implies that the level-1 units (i.e., students) are statistically independent and HLM is not needed (Hayes, 2006). Even though there was no significant variation at Level-2 (i.e., teacher level), for the sake of completeness and as a means for controlling for the non-independence of the sample, subsequent models were tested and discussed utilizing HLM.

Given evidence of non-independence, I proceeded to test a model (See Table 9) with student level perceptions concerning the beliefs their parents hold about intelligence and failure included as predictors at Level 1. Both children's perceptions of parental implicit beliefs (b = .593, *S.E.* = .101, $p < .001$) and children's perceptions of parental beliefs about failure (b = .363, *S.E.* = .095, $p < .001$) were significant positive predictors of their implicit beliefs about intelligence. As with the null model, the level 2 variance component was not significant, ($\widehat{\sigma^2} = .042, p = .266$; one-tailed). Nevertheless, the ICC (.049) for this model still indicated potential problems with non-independence. Although there is no formal R-square value provided when carrying out HLM, it is possible to compute an R-square-type index of the reduction (relative to the null model) in within- and/or between-group variance as function of including the predictors in the model. This is accomplished using the following formula applied to each variance

component (see Heck et al., 2014): $({\sigma^2}_{M1} - {\sigma^2}_{M2})/{\sigma^2}_{M1}$. The reduction (relative to the null model) in variance within teachers/classrooms after controlling for the predictors was [(1.34-.811)/1.34] .529, or 52.9%. The reduction in variance between classrooms was [(.200-.042)/.200] .79, or 79%.

Table 9
Predictors of Student Implicit Beliefs using a 1-Level HLM with predictors at one level

Variable		Coefficient	Standard Error	*p* value
Level 1				
Perceptions of parent implicit beliefs		.593	.101	<.001
Perceptions of parent failure beliefs		.363	.095	<.001
Variance Components				
Parameter	Variance Component	Standard Error	Wald Z	*p* value
Level-1	.811	.132	6.17	<.001
Level-2	.042	.067	.625	.532

The next model (See Table 10) added in teacher implicit beliefs and teacher beliefs about failure as Level-2 predictors. The Level-1 predictors of children's perceptions of parental implicit beliefs (and b = .579, *S.E.* = .102, p < .001) and children's perceptions about parental beliefs about failure (b = .358, *S.E.* = .098, p < .001) were both significant positive predictors of student implicit beliefs.

Given the lack of significant variation in the intercepts after controlling for the Level 1 predictors, the Level 2 predictors, teacher implicit beliefs (b = .144, *S.E.* = .243, p = .287) and teacher beliefs about failure (b = .021, *S.E.* = .195, p = .459) were not significant predictors of students' implicit beliefs about intelligence. Once again, the variance component for the random intercepts was not significant, ($\widehat{\sigma^2} = .075, p = .217$; one-tailed). The ICC for the model was .084, which was still fairly substantial. The reduction in variance within teachers/classrooms as a result of including the Level 2 predictors was 0%, whereas the variance between classrooms appeared to increase somewhat.

Table 10

Predictors of Student Implicit Beliefs Using a 2-Level HLM with Predictors at all Levels

Variable	Coefficient	Standard Error	*p* value
Level 1			
Perceptions of parent implicit beliefs	.579	.102	<.001
Perceptions of parent failure beliefs	.358	.098	<.001
Level 2			
Teacher implicit beliefs	.144	.592	.574
Teacher beliefs about failure	.021	.195	.918

Variance Components				
Parameter	Variance Component	Standard Error	Wald Z	*p* value
Level-1	.811	.131	6.16	<.001
Level-2	.075	.096	.782	.434

Given that beliefs about intelligence and failure are assumed to be independent constructs (Haimovitz & Dweck, 2016), I decided to perform a final HLM analysis, whereby the interaction between the two Level 1 predictors are included in the model (See Table 11). Thus, in addition to the main effects of the Level-1 predictors (children's perceptions of parental beliefs about failure and children's perceptions of parental implicit beliefs) an interaction term was included in the model as a Level 1 predictor. Although the main effects of children's perceptions of parental beliefs about failure (b = -.444, *S.E.* = .324, p = .175) and children's perceptions of parental implicit beliefs (b = -.041, *S.E.* = .260, p = .875) were not statistically significant, the interaction term was statistically significant (b = .174, *S.E.* = .067, p = .012). The significant interaction suggests that the relationship between children's perceptions of parental beliefs about failure may moderate the effects of children's perceptions of parental implicit beliefs on students' implicit beliefs.

Table 11

Predictors of Student Implicit Beliefs using a 2-Level HLM with Predictors at all Levels and the Interaction Between Parental Beliefs

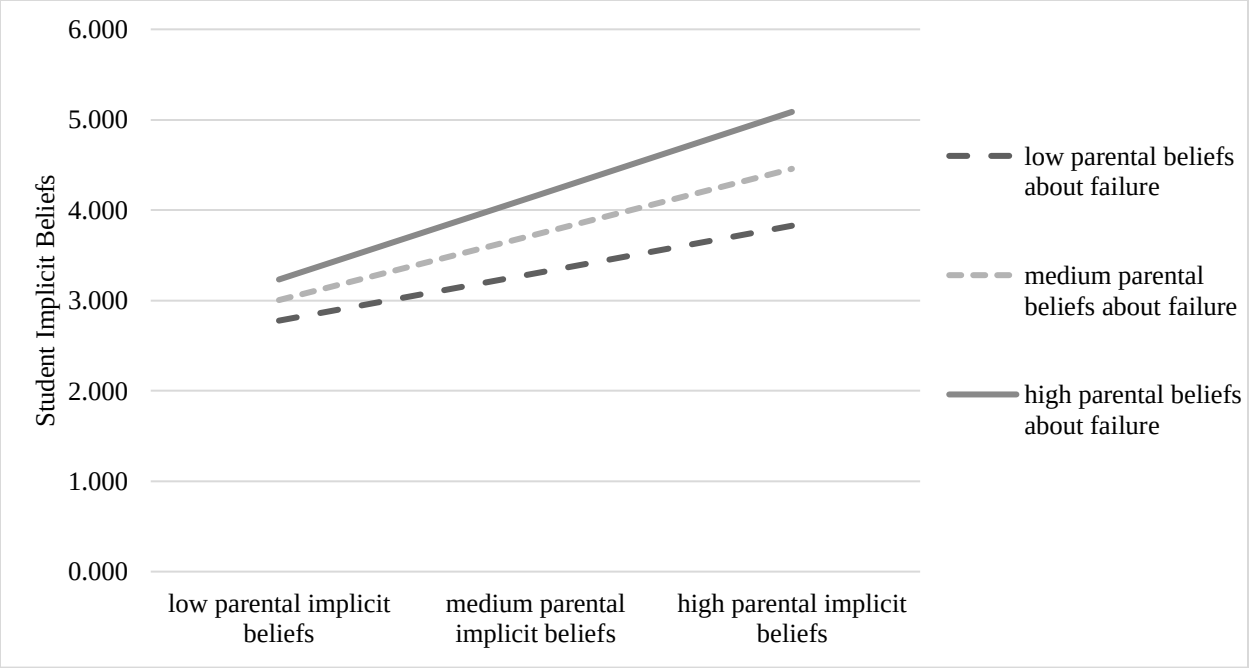
Variable	Coefficient	Standard Error	*p* value

Level 1				
Perceptions of parent implicit beliefs	-.041	.260		.875
Perceptions of parent failure beliefs	-.444	.324		.175
Level 2				
Teacher implicit beliefs	.090	.231		.711
Teacher beliefs about failure	.024	.184		.901
Interaction between parental beliefs about failure and parental implicit beliefs	.174	.067		.012
Variance Components				
Parameter	Variance Component	Standard Error	Wald Z	*p* value
Level-1	.761	.124	6.12	<.001
Level-2	.062	.087	.715	.474

To explore this result further, simple slopes were calculated and visualized using a custom Excel program (Crowson, 2017). This is a common method for evaluating interactions in HLM models that allows for the testing of the product between two or more predictor variables on the dependent variable (Preacher, Curran & Bauer, 2006). The interaction in the previous HLM model suggests that the magnitude of the relations between one predictor (e.g., children's perceptions of parental beliefs about failure or implicit beliefs) and the criterion (e.g., student implicit beliefs) varies as a function of at least one other predictor (e.g., children's perceptions of parental beliefs about failure or implicit beliefs). To probe this result, two simple slope analyses were conducted with children's perceptions of parental beliefs about failure as the moderator in one (see Figure 1) and children's perceptions about parental implicit beliefs as the moderator in the other (see Figure 2). Both analyses used the "pick-a-point technique" (Bauer & Curran, 2005) at specific levels of predictors, (e.g., low, medium, and high values of the variables) when testing the simple slopes. This is the most common method for exploring interactions (Bauer & Curran, 2005).

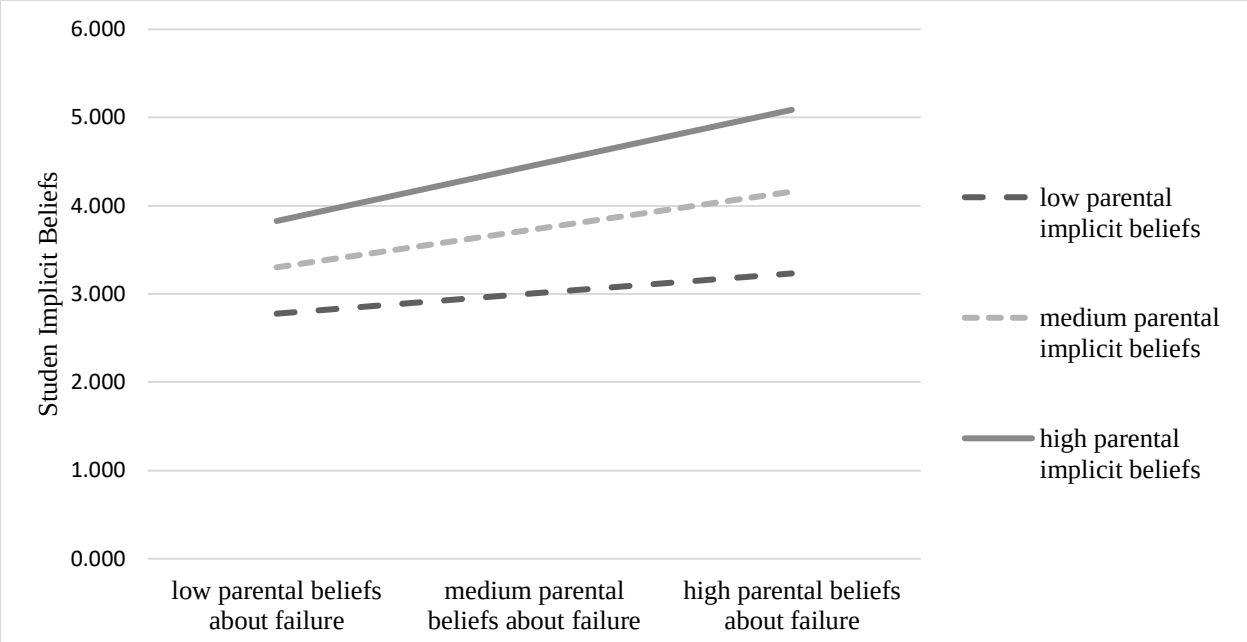
Figure 1

Simple Slopes with Children's Perceptions of Parental Beliefs about Failure as Moderator



The first simple slopes analysis was calculated with the Level-1 Predictor, children's perceptions of parental beliefs about failure, treated as the moderator of the effect of children's perceptions of parental implicit beliefs on student implicit beliefs. The slope was weaker, although significant and positive, for students who had lower implicit belief scores (i.e., entity beliefs) with who have parents who were perceived as having lower beliefs about failure scores (i.e., failure-is-debilitating) and lower implicit belief scores (i.e., entity beliefs), $\beta = .506$, $t(83) = 4.91$, $p < .001$. The slope was strongly positive for students with higher implicit belief scores (e.g., incremental beliefs) who perceived parents as having higher beliefs about failure scores (i.e., failure-is-enhancing) and higher implicit belief scores (e.g., incremental) $\beta = .893$, $t(83) = 5.69$, $p < .001$.

Figure 2
Simple Slopes with Children's Perception of Parental Implicit Beliefs as Moderator



The second simple slopes analysis was calculated with the Level-1 Predictor, children's perceptions of parental implicit beliefs, treated as the moderator of the effect of children's perceptions of parental beliefs about failure on student implicit beliefs. The slope was weaker and positive but not significant for students who had lower implicit beliefs scores (i.e., entity) with perceptions of parents who had lower implicit belief scores (i.e., entity) and lower beliefs about failure scores (i.e., failure-is-debilitating), $\beta = .205$, $t(83) = 1.83$, $p = .069$. The slope was more strongly positive and significant for students with higher implicit belief scores (e.g., incremental) who have perceptions of parents with higher implicit belief scores (e.g., incremental) and higher beliefs about failure scores (i.e., failure-is-enhancing) and $\beta = .566$, $t(83) = 4.52$, $p < .001$.

Discussion

Due to the number of teachers that participated being too low to analyze as a Level-2 predictor, this research instead focused on the Level-1 predictors by investigating the influence of children's perceptions about parental implicit beliefs and children's perceptions of parental

beliefs about failure on student's implicit beliefs. To further explore this relationship, several models were run which included: 1) null model 2) both Level-1 predictors 3) all Level-1 and Level-2 predictors, and 4) interaction effects on Level-1 predictors. To further analyze the significant interaction effects in the last model, two simple slope analyses were conducted.

First, significant variation at the student level (i.e., student implicit beliefs) suggested that subsequent analyses using HLM to control for students nested within classrooms would help further explain this variation.

Hierarchical linear modeling showed significant variation at the student level, suggesting that there were variables (e.g., students' perceptions of parental beliefs) that may help to explain this variation. Subsequent models indicated that both children's perceptions about parental implicit beliefs and children's perceptions of parental beliefs about failure as Level-1 predictors were significant positive predictors of student implicit beliefs, but it was the combination, or interaction effect, that had the greatest influence on students' beliefs.

To further explore this significant interaction and possible moderator effects, two simple slope analyses were conducted to shed light on the dynamic interplay between children's perceptions of parental failure and implicit beliefs on student implicit beliefs. The first simple slope analysis was conducted to explore whether children's perceptions of parental beliefs about failure influenced the strength of the relationship between children's implicit beliefs and children's perceptions of parental implicit beliefs. When children's perceptions of parental beliefs about failure moderated, or influenced, the effect of children's perceptions of parental implicit beliefs on student implicit beliefs, all slopes at all levels (e.g., low, medium, high) were significant. Students had higher implicit belief scores (e.g., growth mindset) when they perceived their parents as believing failure helps you learn and that you can grow your

intelligence. Even those students who themselves had a fixed mindset were positively influenced when they perceived their parents as having a growth mindset and a failure-is-enhancing mindset. Surprisingly, those students who had a fixed mindset were still significantly and positively influenced when they perceived their parents as having a fixed mindset but a failure-is-enhancing mindset.

The second simple slope analysis treated children's perceptions of parental implicit beliefs as the moderator of the influence of children's perceptions of parental beliefs about failure on student implicit beliefs. However, for this analysis, not all slopes were significant. Children's perceptions of parental implicit beliefs do not appear to moderate, or influence, the relationship between children's perceptions of parental beliefs about failure on student implicit beliefs. Yet, for those students who had a growth mindset, there was a significant positive slope if those students had parents who were perceived as having a growth mindset and held a failure-is-enhancing mindset.

Although both simple slope analyses demonstrate that it is advantageous for children to perceive their parents as having more enhancing beliefs (growth mindset and a failure-is-enhancing mindset), an interesting and thought-provoking finding from this study is the difference seen when children's perceptions of parental beliefs about failure is the moderator. Those students with a fixed mindset failed to benefit from parents perceived to have a growth mindset unless parents were also perceived as having a failure-is-enhancing mindset. In other words, it is not enough for a parent to just be perceived as having a growth mindset, they must also be perceived as having a failure-is-enhancing mindset if they are to "boost" their children's beliefs. The child's perceptions of their parent's beliefs about failure, when adaptive, significantly and positively influenced the relationship between their implicit beliefs and their

perceptions of their parents' implicit beliefs. Given previous research on the benefits of having a growth mindset (e.g., Aronson, Fried & Good, 2002; Blackwell et al., 2007; Dweck, 1999; 2002), as well as the numerous intervention studies aiming to move students into a growth mindset (e.g., Yeager et al., 2014; Blackwell, Trzesniewski & Dweck, 2007), this is crucial to study further.

One of the major goals of this research was to determine whether teachers had an influence on student beliefs, but the low number of participants did not allow me to test this. However, several findings of import must be highlighted. First, only one study thus far (Haimovitz & Dweck, 2016) has looked explicitly at beliefs about failure and found them to be predictive of children's beliefs about intelligence. This study partially contradicts those findings and suggests that it is the interaction between these two perceptions of parental beliefs that influences the child's beliefs about intelligence, not just one or the other. More specifically, a failure-is-enhancing mindset in parents helped boost those students who had low implicit beliefs, or a fixed mindset. Given previous research on the impact of incremental versus entity beliefs (e.g., Dweck & Leggett, 1988; Ames & Archer, 1988; Howell & Buro, 2009), these findings broaden our understanding of the role that perceptions of parental beliefs have on children.

Together, these results suggest that it is the combined influence of a parent being perceived as having incremental beliefs (i.e., growth mindset) and a failure-is-enhancing mindset that has the strongest influence on children's beliefs. This combination positively affects those children with low implicit beliefs (i.e., fixed mindset) most and appears to support more of an incremental (i.e., growth mindset) view of intelligence. In other words, if parents believe that intelligence is malleable and able to be changed combined with the view that failure teaches us valuable lessons, their children will believe that intelligence is more malleable as well. Further,

if children have more of a fixed mindset but have parents who believe intelligence is malleable and failure is beneficial, those children may be "lifted up" into more of a growth mindset.

Limitations

Several limitations of this study should be discussed. First, the sample size for this study was small which did not allow for the full exploration of the initial research questions. Only one public school and a private school (two separate campuses) participated in this study, resulting in a low sample size for both teachers and students. The small sample size also limits the generalization of the findings.

Only surveying teachers and students at one-time point in the school year also remains a limitation for this study. This does not allow for the exploration of any changes in the influence a teacher may have on his/her students over the school year. Future research should address this limitation and survey teachers and students at multiple time points, ideally at the beginning, middle, and end of the school year, to further determine how, when, and the extent of teachers influence students' beliefs.

The organization of the survey for students may be a limitation of this study. Children were asked to report their perceptions of parent beliefs, then report their own beliefs. Although a distraction activity was presented between the two surveys, it is unknown whether order effects influenced children's reported self-beliefs.

Conclusions

This research suggests that children's perceptions of parental beliefs about failure, which have only recently been explicitly studied, do influence children's beliefs about intelligence. Haimovitz & Dweck (2016) were the first researchers to introduce this concept as conceptually different from implicit beliefs about intelligence as well as being significantly related to

students' beliefs about intelligence. This study expanded on previous research by Haimovitz and Dweck (2016) by demonstrating that the interaction between children's perceptions of parental beliefs about failure and implicit beliefs significantly affects children's beliefs about intelligence through Hierarchical Linear Modeling. The key finding from this study is that it is not enough for a parent to just be perceived by their children as having a growth mindset, the parent must also be perceived as having a failure-is-enhancing mindset if they are to "boost" their children's beliefs. These results help to further illuminate the dynamic interactions between parents and children and what may be influencing the child's beliefs about his/her intelligence as well as support future research on failure beliefs.

Implications and Future Research

Research has only begun to explore the impact of one's beliefs about failure. However, early findings reveal that an adult's beliefs about failure do influence children's beliefs and thus, should be explored in future research. While their findings are thought provoking, Haimovitz and Dweck (2016) did not provide an operational definition for failure. They refer to failure as a "setback" but do not go into detail, apart from giving as examples receiving low grades or having problems with homework. However, what constitutes a low grade for one student may not carry the same meaning for another student. More specifically, one student may consider a 70% on a test as "low" depending on their previous performance and expectations while another might consider that "high". Further, "problems with homework" is ambiguous and again, would vary from student to student. Do these problems cause the student to be unable to complete the assignment or are these more "challenges" and the student needs to seek help?

First and foremost, researchers must define the concept of failure with greater precision since the lack of a definition hinders the investigation of a potentially important construct. A

qualitative study might be best suited to explore this concept as it allows participants to discuss what they do or do not consider a failure, thus allowing researchers to determine common themes regarding the construct. Those findings can then assist in the development of survey items that tap into more specific aspects of failure.

Considering the far-reaching impact of implicit beliefs in many domains (e.g., intelligence, personality, health, etc.), if beliefs about failure moderate implicit beliefs, future research must explore any possible interactions to further understand the dynamic interplay between one's beliefs. Future research should explore this interaction by surveying students about different school subjects, at various times during the year, and in regard to specific classrooms/teachers.

Future research must also utilize more representative samples of students and parents. The previous study by Haimovitz and Dweck (2016) was done in the San Francisco Bay area with children in highly accomplished households while this study looked at a small sample in a mid-western city. Neither sample is representative of the population as a whole, and thus, findings are not able to be generalized. Future research must address this limitation by sampling students in urban, rural, and suburban school districts across several states.

Given the significant interaction between perceptions of parental beliefs about failure and intelligence, this may be a helpful, and concrete, area to discuss with parents. Schools may develop a "lead by example" program to support parents' beliefs and subsequent behaviors when discussing school work with their children. For example, teachers can explicitly discuss failure in a positive, adaptive light when talking to parents about their children's work and administrators can encourage discussion of failure experiences and subsequent lessons from it with students and parents. If parents internalize that failure is helpful, needed, and something

valuable their child can learn from, coupled with the belief that intelligence can be grown, they can help support their child's beliefs that they also can grow and change and are not "stuck" with certain levels of abilities. Further, if beliefs about failure are more concrete for parents, future research may address this by developing an intervention or workshop series to discuss how best to discuss failure and setbacks with their children. Given previous research showing mixed findings regarding mindset interventions (Sisk, Burgoyne, Sun, Butler & Macnamara (2018), addressing beliefs about failure may be a more successful way of supporting children's beliefs.

Future research must also explicitly study beliefs about failure in an individual as well as how the adults around them influence those beliefs in others. It is not enough just to tell students that they can grow their intelligence if they also think failure is something to be avoided. These are not separate beliefs but rather connected theories that support and feed off of each other, as this study and Haimovitz and Dweck (2016) have shown. Considering the scant research on beliefs about failure, but the extreme prevalence of failure in our everyday lives and the far-reaching implications that depend on our actions following failure, more research is desperately needed.

References

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*(3), 260–267. http://doi.org/10.1037/0022-0663.80.3.260

Anderman, E. M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle-level schools. *Contemporary Educational Psychology, 22*(3), 269–298. http://doi.org/http://dx.doi.org/10.1006/ceps.1996.0926

Aronson, J., Fried, C. B., & Good, C. (2002). Reducing stereotype threat and boosting academic achievement of African American students: The role of conceptions of intelligence. *Journal of Experimental Social Psychology, 38*(2), 113-125.

Bauer, D. J., & Curran, P. J. (2005). Probing interactions in fixed and multilevel regression: Inferential and graphical techniques. *Multivariate Behavioral Research, 40*(3), 373–400. http://doi.org/10.1207/s15327906mbr4003

Bennett, J. (2017). On Campus, Failure is on the Syllabus. Retrieved November 12, 2017, from https://www.nytimes.com/2017/06/24/fashion/fear-of-failure.html

Blackwell, K. L., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246–263.

Cain, K. M., & Dweck, C. S. (1995). The relation between motivational patterns and achievement cognitions through the elementary school years. *Merrill-Palmer Quarterly*, *41*(1), 25–52.

Church, M. A., Elliot, A. J., & Gable, S. L. (2001). Perceptions of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*, *93*(1), 43–54. http://doi.org/10.1037/0022-0663.93.1.43

De Castella, K., Byrne, D., & Covington, M. (2013). Unmotivated or motivated to fail? A cross cultural study of achievement motivation, fear of failure, and student disengagement. *Journal of Educational Psychology*, *105*(3), 861–880.

Diener, C. L, & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy and achievement cognitions following failure. *Journal of Personality and Social Psychology*, *36*(5), 451- 462.

Diener, C. I., & Dweck, C. S. (1980). An analysis of learned helplessness: II. The processing of success. *Journal of Personality and Social Psychology*, *39*(5), 940-952.

Dweck, C. S. (1999). Self-theories: Their role in motivation, personality, and development. Philadelphia: Psychology Press.

Dweck, C. S. (2002). The development of ability conceptions. In A. Wigfield & J. Eccles (Eds.), *The Development of Achievement Motivation*. New York: Academic Press.

Dweck, C. S., Chiu, C.Y., & Hong, Y.Y. (1995). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry*, *6*(4), 267–285.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256–273. http://doi.org/10.1037//0033295X.95.2.256

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, *34*(3), 169–189.

Friedel, J. M., Cortina, K. S., Turner, J. C., & Midgley, C. (2007). Achievement goals, efficacy beliefs and coping strategies in mathematics: The roles of perceived parent and teacher goal emphases. *Contemporary Educational Psychology*, *32*(3), 434–458. http://doi.org/10.1016/j.cedpsych.2006.10.009

Gutshall, C. A. (2016). Student perceptions of teachers' mindset beliefs in the classroom setting. *Journal of Educational and Developmental Psychology*, *6*(2), 135–142. http://doi.org/10.5539/jedp.v6n2p135

Gunderson, E. A., Gripshover, S. J., Romero, C., Dweck, C. S., Goldin-Meadow, S., & Levine, S. C. (2013). Parent praise to 1- to 3-year-olds predicts children's motivational frameworks 5 years later. *Child Development*, *84*(5), 1526–1541. http://doi.org/10.1111/cdev.12064

Haimovitz, K., & Dweck, C. S. (2016). What predicts children's fixed and growth intelligence mind-sets? Not their parents' views of intelligence but their parents' views of failure. *Psychological Science*, *27*(6), 859–869. http://doi.org/10.1177/0956797616639727

Hayes, A. F. (2006). A primer on multilevel modeling. *Human Communication Research*, *32*,

385–410. http://doi.org/10.1111/j.1468-2958.2006.00281.x

Heck, R.H., & Thomas, S.L. (2015). *An introduction to multilevel modeling techniques: MLM and SEM approaches using MPLUS*. Routledge: New York

Heck, R.H., Thomas, S.L., & Tabata, L.N. (2014*). Multilevel and longitudinal modeling with IBM SPSS* (2nd ed.). Routledge: New York.

Hong, Y., Chiu, C.-Y., Dweck, C. S., Lin, D. M., & Wan, W. (1999). Implicit Theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology*, *77*(3), 588–599.

Howell, A. J., & Buro, K. (2009). Implicit beliefs, achievement goals, and procrastination: A mediational analysis. *Learning and Individual Differences*, *19*(1), 151–154.

Jonsson, A.-C., Beach, D., Korp, H., & Erlandson, P. (2012). Teachers' implicit theories of intelligence: Influences from different disciplines and scientific theories. *European Journal of Teacher Education*, *35*(4), 387–400. http://doi.org/10.1080/02619768.2012.662636

Jose, P. E., & Bellamy, M. A. (2012). Relationships of parents' theories of intelligence with children's persistence/learned helplessness: A cross-cultural comparison. *Journal of Cross-Cultural Psychology*, *43*(November), 999–1018. http://doi.org/10.1177/0022022111421633

Kaplan, A., Gheen, M., & Midgley, C. (2002). Classroom goal structure and student disruptive behavior. *The British Journal of Educational Psychology*, *72*(July 2002), 191–211. http://doi.org/10.1348/000709902158847

Kapur, M. (2014). Productive failure in learning math. *Cognition and Instruction*, *26*(3), 379 425. http://doi.org/10.1111/cogs.12107

Lee, K. (1996). A study of teacher responses based on their conceptions of intelligence. *Journal of Classroom Interaction*, *31*(2), 1–12.

Lin-Siegler, X., Ahn, J. N., Chen, J., Anny Fang, F.-F., & Luna-Lucero, M. (2016). Even einstein struggled: Effects of learning about great scientists' struggles on high school students' motivation to learn science. *Journal of Educational Psychology*, *108*(3), 314 328. http://doi.org/10.1037/edu0000092

Lou, N. M., & Noels, K. A. (2016). Changing language mindsets: Implications for goal orientations and responses to failure in and outside the second language classroom. *Contemporary Educational Psychology*, *46*, 22–33.

Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom goal structure, student motivation, and academic achievement. *Annual Review of Psychology*, *57*, 487–503. http://doi.org/10.1146/annurev.psych.56.091103.070258

Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, *75*(1), 33 52. http://doi.org/10.1037/0022-3514.75.1.33

Ommundsen, Y., Haugen, R., & Lund, T. (2005). Academic self-concept, implicit theories of ability, and self-regulation strategies. *Scandinavian Journal of Educational Research*, *49*(5), 461–474. http://doi.org/10.1080/00313830500267838

Park, D., Gunderson, E. A., Tsukayama, E., Levine, S. C., & Beilock, S. L. (2016). Young children's motivational frameworks and math achievement: Relation to teacher-reported instructional practices, but not teacher theory of intelligence. *Journal of Educational Psychology*, *108*(3), 300–313. http://doi.org/10.1037/edu0000064

Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of School Psychology*, *48*(1), 85–112. http://doi.org/10.1016/j.jsp.2009.09.002

Pomerantz, E. M., & Dong, W. (2006). Effects of mothers' perceptions of children's competence: The moderating role of mothers' theories of competence. *Developmental Psychology*, *42*(5), 950–961. http://doi.org/10.1037/0012-1649.42.5.950

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*, *31*(3), 437–448

Rattan, A., Good, C., & Dweck, C. S. (2012). "It's ok — not everyone can be good at math": Instructors with an entity theory comfort (and demotivate) students. *Journal of Experimental Social Psychology*, *48*(3), 731–737. http://doi.org/10.1016/j.jesp.2011.12.012

Schleider, J. L., Abel, M. R., & Weisz, J. R. (2014). Implicit theories and youth mental health problems: A random-effects meta-analysis. *Clinical Psychology Review, 35*, 1–9. http://doi.org/10.1016/j.cpr.2014.11.001

Schunk, D. H. (2012). *Learning Theories: An Educational Perspective* (6th ed.). Boston, MA.

Schwinger, M., & Stiensmeier-Pelster, J. (2011). Performance-approach and performance avoidance classroom goals and the adoption of personal achievement goals. *British Journal of Educational Psychology*, *81*(4), 680–699. http://doi.org/10.1111/j.2044 8279.2010.02012.x

Sitkin, S. B. (1992). Learning through failure: The strategy of small losses. *Research in Organizational Behavior, 14*, 231-266

Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science*, *29*(4), 549–571. http://doi.org/10.1177/0956797617739704

Stevens, J.P. (2002). Applied multivariate statistics for the social sciences (4th ed). Lawrence Erlbaum: Mahwah, NJ.

Stipek, D. J., Givvin, K. B., Salmon, J. M., & MacGyvers, V. L. (2001). Teachers' beliefs and practices related to mathematics instruction. *Teaching and Teacher Education*, *17*(2), 213–226. http://doi.org/10.1016/S0742-051X(00)00052-4

Tavakol, M., & Dennick, R. (2011). Making sense of cronbach's alpha. *International Journal of*

Medical Education, *2*, 53–55. http://doi.org/10.5116/ijme.4dfb.8dfd

Urdan, T. (2004). Using multiple methods to assess students' perceptions of classroom goal structures. *European Psychologist*, *9*(4), 222–231. http://doi.org/10.1027/1016 9040.9.4.222

Urdan, T., Midgley, C., & Anderman, E. M. (1998). The role of classroom goal structure in students' use of self-handicapping strategies. *American Educational Research Journal*, *35*(1), 101–122. http://doi.org/10.3102/00028312035001101

VanLehn, K., Siler, S., Murray, C., Yamauchi, T., & Baggett, W. B. (2003). Why do only some events cause learning during human tutoring? *Cognition and Instruction*, *21*(3), 209–249. http://doi.org/10.1207/S1532690XCI2103_01

Yeager, D. S., Johnson, R., Spitzer, B. J., Trzesniewski, K., Powers, J., & Dweck, C. S. (2014). The far-reaching effects of believing people can change: Implicit theories of personality shape stress, health, and achievement during adolescence. *Journal of Personality and Social Psychology*, *106*(6). 867-884

Appendix A

All surveys will employ a Likert-type scale with 1 being highly disagree and 6 being highly agree. Items with an asterisk (*) will be reverse coded.

Teachers' beliefs about failure will be assessed with six items. Higher scores indicate stronger endorsement of a failure-is-enhancing mindset. The items were originally presented in this order:

1. The effects of failure are positive and should be utilized.
2. Experiencing failure facilitates learning and growth.
3. Experiencing failure enhances my performance and productivity.
4. *Experiencing failure inhibits my learning and growth.
5. *Experiencing failure debilitates my performance and productivity.
6. *The effects of failure are negative and should be avoided.

Teachers' intelligence mindsets will be assessed with eight items. Higher scores indicate stronger endorsement of an incremental belief.

1. *You have a certain amount of intelligence, and you can't really do much to change it.
2. *Your intelligence is something about you that you can't change very much.
3. No matter who you are, you can significantly change your intelligence level.
4. *To be honest, you can't really change how intelligent you are.
5. You can always substantially change how intelligent you are.
6. *You can learn new things, but you can't really change your basic intelligence.
7. No matter how much intelligence you have, you can always change quite a bit.
8. You can change even your basic intelligence level considerably.

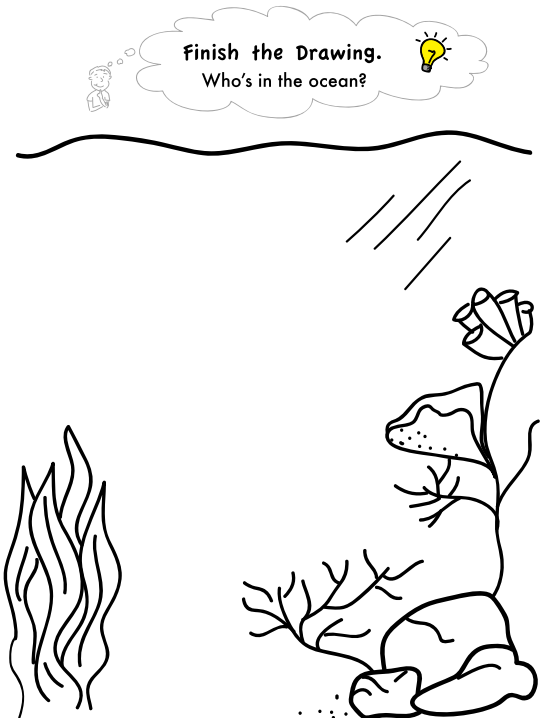
Appendix B

All surveys will employ a Likert-type scale with 1 being highly disagree and 6 being highly agree. Items with an asterisk (*) will be reverse coded.

Children's intelligence mindsets will be assessed with three items. Higher scores indicate stronger endorsement of an incremental belief.

1. *How smart you are is something about you that you can't change very much.
2. *You're a certain amount of smart and you can't really do much to change it.
3. *You can learn new things, but you can't change how smart you really are.

The short activity that will be presented at the end of the previous items is as follows. It will be enlarged to fit a standard piece of paper. The activity will be on the back of the first page of questions and will take up the entire page. The next set of questions will begin on the beginning of the third page, following the activity.



Children's perceptions of their parents' beliefs about failure and intelligence will be assessed with seven items. Higher scores on these items indicate they perceive their parents as having a stronger endorsement of a failure-is-enhancing mindset and incremental beliefs.

1. *My parent/guardian thinks failure hurts my learning.
2. My parent/guardian thinks failure can help me learn.
3. My parent/guardian thinks failure can help me grow.
4. *My parent/guardian thinks failure is bad and should be avoided.
5. *My parent/guardian thinks you can learn new things but you can't change how smart you really are.
6. *My parent/guardian thinks how smart you are is something you can't change very much.
7. My parent/guardian thinks you can always change how smart you are.