"This is hard!": Children's and parents' talk about difficulty during dyadic interactions

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Abstract

Children's beliefs about the contribution of effort and ability to success and failure shape their decisions to persist or give up on challenging tasks, with consequences for their academic success. But how do children learn about the concept of "challenge"? Prior work has shown that parents' verbal responses to success and failure shape children's motivational beliefs. In this study, we explore another type of talk - parent and child talk about difficulty - which could contribute to children's motivational beliefs. We performed secondary analyses of two observational studies of parent-child interactions in the United States (Boston and Philadelphia) from age 3 to 4th grade (Study 1, 51% girls, 65.5% White, at least 43.2% below Federal poverty line) and at 1st grade (Study 2, 54% girls, 72% White, family income-to-needs ratio M(SD) = 4.41(2.95)) to identify talk about difficulty, characterize the content of those statements, and assess whether task context, child and parent gender, child age, and other parent motivational talk were associated with quantity of child and parent difficulty talk. We found that many families did discuss difficulty, with variation among families. Parents and children tended to use general statements to talk about difficulty (e.g., "That was hard!"), and task context affected child and parent difficulty talk. In the NICHD-SECCYD dataset, mothers' highlighting how task features contributed to task difficulty was positively correlated with their process praise, suggesting that this talk could be motivationally relevant.

Keywords: Motivational Frameworks, Academic Achievement, Parent-child Interactions

Public Significance Statement

By examining parent-child interactions, we found that preschool and elementary-school-aged children and their parents talk about how "easy" and "hard" tasks are to complete. This type of talk varied across families and contexts, and occurred most often during goal-directed,

challenging tasks. Further understanding when families talk about task difficulty and what messages they communicate is important to know how parents can best support children's approach toward mastering challenging tasks.

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To learn, we have to both be willing to try and then persist on things we find challenging. However, both children and adults vary in their pursuit of and persistence on challenging tasks (Wigfield & Cambria, 2010; Dweck et al., 1988). Decades of research has investigated why these differences in challenge-seeking emerge and their consequences for children's learning at home and in school. Two main lines of research have taken shape: first, research aiming to understand the parent and child beliefs that support challenge-seeking (e.g., motivational frameworks, Yeager et al., 2019), and second, research investigating how specific parent messages influence children's beliefs and challenge-seeking behaviors (e.g., process praise, Mueller & Dweck, 1998, Gunderson, Sorhagen et al., 2018). However, little research has explicitly investigated how children develop a concept of "challenge" that underlies their choice of goals to pursue or avoid. Further, research on parent messages has been mostly limited to praise, which is not the only way parents communicate motivational beliefs to children. In this study, we examine parent and child spontaneous talk about how "hard" and "easy" tasks are to complete during naturalistic interaction in two datasets. In doing so, we aim to explore how children learn about what is challenging and why.

What Children Understand About Challenge

Challenge-seeking and persistence on challenging tasks are associated with positive learning outcomes for children (Blackwell et al., 2007; Yeager et al., 2019). As a result, much research has focused on what children understand about challenge, how challenge-seeking changes over development, and what environmental factors contribute to individual differences in challenge-seeking (Mueller & Dweck, 1998; Cimpian et al., 2007; Leonard et al., 2021, 2022; Bong et al., 2009; Gunderson, Donnellan, et al., 2018; Urdan & Midgeley, 2003; Hicks

Anderman & Anderman, 1999; Gunderson et al., 2013; Leonard et al., 2017).Much of what we know about young children's understanding of "challenge" comes from research investigating children's reasoning about component or related concepts. For example, many researchers have tried to understand how reasoning about a person's competence and effort as well as task difficulty allows us to judge why someone has succeeded or failed on a task (for example, Muenks & Miele, 2017; Nicholls, 1978; Nicholls & Miller, 1983). Early work suggested that children under eight years of age could not reason in adult-like ways about why someone might succeed or fail: they conflated effort with success, assuming that people who try harder are always more likely to succeed (Stipek & Tannatt, 1984; Nicholls, 1978). More recent work suggests that three- to five-year olds *can* reason about the relationship between effort and competence in an adult-like way if researchers verbally identify the concepts for them (saying a character "tried and tried on puzzles" or "thought the puzzles were hard to do"; Heyman & Compton, 2006). Emphasizing a character's perception of a task as difficult made children more likely to endorse the belief that success is the result of static ability (e.g., a fixed mindset, Heyman & Compton, 2006). Four- to five-year-old children can also use external cues, like age, to infer others' relative competence and assign easy and hard tasks flexibly depending on whether they are in a cooperative or competitive context (Magid et al., 2018). In short, young children may need support to reason about the interrelations among concepts like competence, effort, and task difficulty, and conceptual development in this area seems to continue through the early school years.

Developmental Change in Challenge-Seeking

As children are developing their understanding of what it means for something to be challenging during the elementary school years, their preferences for challenge-seeking are also

shifting. In one study, third graders showed stronger preferences for selecting challenging tasks that offer an opportunity for learning (a preference referred to as a *learning goal*) versus selecting easier tasks that allow them to display their competence (a *performance goal*) (Bong, 2009). However, in the same study, middle-schoolers showed a stronger preference for performance goals than learning goals, suggesting a developmental shift (Bong, 2009). Other work has also shown that between 1st and 6th grade, children show a declining preference for selecting challenging tasks as age increases (Gunderson, Donnellan, et al., 2018; though see Meece & Miller, 2001 for some heterogeneity within this developmental window). Given that learning in the early school years is crucial for later academic success (e.g., Duncan et al., 2007), it is important to understand what environmental factors may influence children's challenge-seeking behaviors during this developmental period.

Individual Differences and Environmental Influences on Challenge-Seeking

Research has already revealed several environmental factors that relate to children's tendency to select challenging goals, including the global goals emphasized within classrooms, adults' praise, and adults' own persistence (Urdan & Midgeley, 2003; Hicks Anderman & Anderman, 1999; Mueller & Dweck, 1998; Gunderson et al., 2013; Leonard et al., 2017; Leonard et al., 2020). For example, middle schoolers' perception of the emphasis that their classrooms placed on selecting challenging tasks (versus demonstrating good academic performance) is associated with their beliefs about whether they should choose challenging versus easy tasks (Urdan & Midgeley, 2003; Hicks Anderman & Anderman, 1999). In addition, children who hear *process praise* – positive feedback that emphasizes the role of effort in success, e.g., "you worked hard" – are more likely to enjoy and pursue challenging tasks that they previously failed to complete (Mueller & Dweck, 1998). The relationship between process

praise and challenge-seeking and persistence holds across ages (18-months to 10 years) and research contexts (within free-form parent-child interactions in the lab, Lucca, Horton & Sommerville, 2019; parent-child interactions in the home, Gunderson et al., 2013, Leonard et al., 2022; and experimenter-delivered praise at school, Mueller & Dweck, 1998). Finally, toddlers and preschoolers who observe an adult persisting on a challenging task persist longer themselves on a separate task (Leonard et al., 2017, 2020). Thus, adults' messages and behaviors provide children with information about what to do in the face of challenge: in the current study, we aim to further understand what some of these verbal messages might be.

Why Parent Talk About Difficulty Helps Us Understand Children's Challenge-Seeking

Investigations into how parents' verbal messages shape children's challenge-seeking and persistence have so far focused almost exclusively on praise. However, praise is likely not the only motivationally-relevant message that children hear. As just one example, parents' beliefs about failure seem to be salient to elementary-school-aged children. Children's perceptions of their parents' belief that failure is "debilitating" or "enhancing" relate to children's beliefs about whether or not they should choose challenging goals (Haimovitz & Dweck, 2016). As another example, parents' greater negative evaluative feedback (e.g., "That's not where that goes!") when children were 2 years old was associated with greater shame when those children attempted challenging tasks a year later (Kelley et al., 2000). Recent work suggests that there could even be interactions among parents' messages, parents' own effort, and task outcomes: preschoolers persisted most after watching an adult exert effort, state the importance of effort, and then actually succeed in a task (Leonard et al., 2020). Parents' talk about how "easy" and "hard" tasks are to complete may be another way that they communicate motivationally-relevant beliefs to their children.

The Present Study

During early childhood and into elementary school, children are building both their understanding of what makes tasks challenging and their orientation towards those challenging tasks. Here, we wanted to know whether and how parents explicitly talk with their children about what tasks are "easy" and "hard" and why those tasks vary in difficulty. To address this question, we examined parents' and children's spontaneous talk about task difficulty in two existing datasets: one longitudinal, following mother-child pairs from age 3 years to 4th grade (Study 1) and one with both mother-child and father-child interactions at a single, 1st grade time point (Study 2).

Characterizing Difficulty Talk

One goal of our investigation was to characterize the verbal content of difficulty talk. We focused on four theoretically-motivated dimensions of variation. First, we examined whether parents and children talked about a task being "hard" or "easy". Families could be more likely to talk about challenge than ease, or vice versa.

Second, we looked at whether parents and children communicated about their expectations of task difficulty in advance, or reflected on task difficulty after the fact. The timing of parents' and children's difficulty talk could help us understand whether families talk about difficulty after a task (e.g., to make sense of their experiences) or before a task (e.g., to determine how much effort to expend).

Third, leveraging prior work on parent praise, we categorized difficulty talk based on whether it emphasizes the person as the source of ease or difficulty, similar to person praise. We reasoned that the inclusion of an explicit referent in a difficulty statement (e.g., "that was hard

for you"; "that was easy *for me*") may function similarly to person praise, by emphasizing the role of individual ability in determining task difficulty.

Fourth, also leveraging work on praise, we examined whether difficulty statements included specific information about the task-based source(s) of difficulty or ease. Difficulty statements, like process praise, may include information about specific features of a task (e.g., "it was hard *to put the pieces in*") which emphasizes the role of specific processes, steps, and actions in determining task difficulty. However, like general praise, families could provide no attribution for why tasks are challenging or easy (e.g., "that was hard").

In examining these aspects of the content of difficulty talk, we sought to understand whether and how families talk about difficulty, if there are individual differences in difficulty talk, and what kinds of messages are included in this difficulty talk.

Child, Parent, and Contextual Factors that Might Shape Difficulty Talk

Importantly, there could be individual and contextual factors that shape families' talk about task difficulty, which we explored to the extent possible in these samples. First, there are mixed findings in past research on parent praise regarding whether parents use different amounts of process praise with children of different genders (e.g., in one study boys heard more process praise – Gunderson et al., 2013; in another, there were no gender differences in process praise - Ren et al., 2022). Therefore, we explored whether child gender was associated with the extent to which children and parents talked about difficulty. Although we did not have specific predictions about the frequency of difficulty language in Study 1, in Study 2, we expected the fact that parents and children were completing spatial tasks (e.g., Etch-a-Sketch, blocks) may lead to more gendered patterns of difficulty language. Specifically, given early-emerging gender differences in children's spatial skills and parents' engagement in spatial tasks (Levine et al.,

2012; Pruden & Levine, 2017), we predicted that parents in Study 2 would be more likely to talk about how "hard" tasks were with girls than boys.

In addition, because Study 2 included children interacting with both mothers and fathers, we were able to examine whether mothers versus fathers would be more likely to engage in difficulty talk during these spatial tasks. We speculated that mothers might talk about how "hard" tasks are more frequently than fathers, reflecting mothers' own response to the task, based on previous findings that women report higher levels of spatial anxiety than men (Lyons et al., 2018). Further, parents' income and education are often associated with the overall amount of talk between parents and children (Hoff, 2003). For example, college-educated mothers, compared to mothers who completed only high school, spoke more word tokens and types, and made longer utterances to their 2-year-olds. In turn, these speech differences mediated vocabulary growth vocabulary (Hoff, 2003). To ensure that variation in families' difficulty talk did not only reflect more global differences in amount of talk, we included parent income and education as covariates. In addition, prior work on parent praise has not found family socioeconomic status (SES) – a combination of parent education and income to needs ratio - to predict total amount of praise, but has shown a relationship between SES and parents' mindsets and, in turn, the type of praise they use with children (Gunderson et al., 2013). Interestingly, higher SES parents held less growth mindsets, and parents with less growth mindsets used less "person" praise (Gunderson et al., 2013). As a result, we examined the relationship between parent income and education and parents' and children's difficulty talk to determine if any such patterns might exist for this type of language.

Different tasks may elicit different amounts of difficulty talk from parent-child pairs. A previous study using the Study 2 dataset found that parents produced different amounts of praise

depending on task (Ren et al., 2022). We included task in our models to determine if parents and children were more or less likely to talk about difficulty in the context of particular tasks. If variation did exist by task, we hoped to be able to make some inferences about what task features shaped variation in difficulty language. Although the tasks used in these studies were not selected to precisely manipulate task parameters, they included a number of tasks that varied in their content, formality, and structure (Study 1: free play with toys, a magnet game, a family meal time, a letter-writing task, Study 2: Etch-a-Sketch, 2-D and 3-D blocks, card game). Thus, investigating task differences in difficulty talk may give us clues as to which types of tasks are most likely to elicit this kind of language.

Finally, other lines of research have investigated parent behaviors (rather than talk), such as parents' tendency to "take over" when parent-child pairs are confronted with challenge (e.g., Kelley et al., 2000; Leonard et al., 2021) and how that can decrease children's own persistence. Here, we investigated whether motivationally-relevant parent and child behaviors were related to the frequency of difficulty language, by examining associations between difficulty language and several global measures of behavior (including child agency, child negativity, parent autonomy support, and parent-child goal-directed partnership) that were available in the Study 2 dataset.

Research Questions and Hypotheses

Exploratory Research Questions. In Studies 1 and 2, we had several main exploratory research questions. First, we anticipated that parents and children would produce at least some *easy* and *hard* statements, but we wanted to know how frequently they did so. Further, we explored whether parents who talked more about difficulty had children who did so as well. Second, we wanted to know whether and how parents' and children's difficulty talk differed across tasks within each dataset. Third, we wanted to know about the frequency of the four

descriptive categories for each difficulty statement. Finally, we explored whether family income and parent education were associated with parents' and children's difficulty talk, without any a priori hypotheses about the direction of these associations.

In addition to these exploratory research questions, we had several a priori hypotheses specific to each study:

Study 1 Hypotheses. The longitudinal structure of Study 1 allowed us to examine the stability of difficulty talk over time. Based on previous work suggesting that parents' praise production is stable over time (e.g., Gunderson et al., 2013), we predicted that parents' use of difficulty language would also be stable over time.

Study 2 Hypotheses. In Study 2, the spatial tasks were chosen to be challenging for children to complete on their own, so we predicted that parents and children would talk about how "hard" tasks were to complete more frequently than how "easy" tasks were to complete. Next, we examined whether a particular kind of difficulty talk – talk that specified a particular feature that made a task *easy* or *hard* to complete (e.g., "It was easy to rotate and fit those pieces together") – was correlated with parents' process praise. We hypothesized that these two kinds of statements have functional similarity, and therefore would be positively correlated. As noted previously, we also had specific predictions about parent and child gender differences. We predicted that during the spatial tasks in Study 2, parents would be more likely to talk about how "hard" tasks were with girls than boys, as a result of early-emerging gender differences in spatial skills and spatial play (Levine et al., 2012; Lauer et al., 2019). Separately, we predicted that mothers would produce more "hard" statements than fathers, as a result of negative gender-based beliefs about their own spatial skills. Next, we tested the relationship between the kinds of child and parent difficulty talk and global aspects of child and parent behavior during the study

interactions, which were scored by the original researchers (NICHD Early Child Care Research Network, 2005). We expected that children who displayed greater negativity during the session would be more likely to talk about how *hard* the tasks were to complete. Conversely, we predicted that children who displayed greater agency and more effectively engaged in goal-directed partnership with their parent during the sessions would talk less frequently about how *hard* tasks were.

Study 1 Methods

Data Source

In Study 1, we examined mother-child interactions from the Home-School Study of Language and Literacy Development (HSLLD) corpus collected when children were three years old until they were in fourth grade (Dickinson & Tabors, 2001). Researchers from Harvard University, Tufts University, Clark University, and the Educational Development Center in Newton, MA started this longitudinal study in 1987. The study recruited children from preschools and health centers in and around Boston, MA whose families qualified for Head Start (based on income), whose parents had stopped school at 12th grade (though some parents had started other education after the birth of the target child), and who spoke English (Dickinson & Tabors, 2001). The researchers asked programs to distribute flyers about the study to families who met these criteria, and families who contacted the researchers from the flyers participated. The initial study examined the home and school social factors that influence young children's language and literacy development focusing on children from low socio-economic status (SES) backgrounds (Dickinson & Tabors, 2001). We accessed transcripts and associated data from this study via the Child Language Data Exchange System database, an open access database of transcripts and audio recordings from child development and linguistics studies (CHILDES;

MacWhinney, 2000). We report sample size, data exclusions, and measures used by the original research teams for both studies, as well as additional exclusions of data or measures that we undertook for the present project. Data for Study 1 is available through the CHILDES data base (https://childes.talkbank.org/access/Eng-NA/HSLLD.html), which is publicly available, fully deidentified data. Data were analyzed using R, version 4.1.3 (R Core Team, 2022) and the package *tidyverse*, version 1.3.1 (MIT, 2021). This project's design and analysis were not pre-registered, and analysis code is available at (https:// osf.io/6kcxv).

Participants

Eighty-two families began the study, including two families with twins, for a total of 84 children (Beals & DeTemple, 1992). The CHILDES database included person-level data for child gender (49% boys and 51% girls) and age at each observation (mean age across all observations = 72.79 months, SD = 11.37).

For other demographic information (race/ethnicity, mother's education, and family income), only summary statistics were available from prior publications. Data collected at the beginning of the study showed that 65.5% of children were White, 27.4% of children were Black, and 7.1% were Hispanic (Beals & DeTemple, 1992). When the study started, 25.5% of mothers had not completed high school, 48.8% of mothers had completed high school, and 26.6% of mothers had completed some post-high school education (Beals & DeTemple, 1992). Partial information is available on annual family income (n=74 families from the 5-year-old time point): 43.2% of families reported making less than $10,000 per year, 12.2% of families reported $10,000 to $15,000, 17.6% reported $15,000 to $20,000, 10.8% reported $20,000 to $25,000, and 16.2% reported more than $25,000 (Dickinson & Tabors, 2001). For rough context, the poverty threshold for a family of four in 1987 was $11,611 (US Bureau of the Census, 1988).

Although we planned to examine both mother and father speech, we found that many interactions included only one parent, who was almost always the mother. As a result, we decided to analyze only mothers' speech, which made up 688 out of 694 interactions, or 99.1% of all interactions.

Procedure

Data collection started when children were 3 years old and continued at follow-up sessions when children were 4 years old, 5 years old, in 2nd grade, and in 4th grade. At each time point, the researchers visited families in their homes for a one- to three-hour session. Mother and child were video- and audio-recorded completing two to five tasks at each session, though the tasks completed in each session varied. In addition to these sessions with a researcher, families were given a tape recorder and asked to audio record one meal-time at each time point. The original research team transcribed all interactions from audiotape and video.

During the toy play (TP) task, which took place when children were 3, 4, and 5 years old, the mother and child engaged in about 10 minutes of free play experimenter-provided toys. The exact toys changed based on what was age-appropriate at each time point (3 years: blocks, toy cars, tea set, spoons and plates, school bus with dolls, toy baby bottle, a puzzle, toy telephones, and a kaleidoscope, 4 years: different puzzle, dress-up hats and beads, firefighter hat, 5 years: different puzzle and toy animals) (Dickinson & Tabors, 2001). During the magnet game (MG), which took place when children were 5 years old and in 4th grade, the mother and child engaged in about 10 minutes of free play with a magnet set that included a large magnetic base and several different kinds of smaller magnet pieces. The letter writing task (LW) occurred when children were in 2nd and 4th grades, when the child and mother collaboratively wrote a letter to Eric Carle about his book "The Very Hungry Caterpillar".

We selected tasks that we thought would yield mother and child talk about the *difficulty* of tasks. We excluded one task where mothers encouraged their child to tell an experimenter about a memory, and one task where the mother and child read a children's book together. One of five trained research assistants coded each transcript. To begin, all research assistants (including the first author) read the coding manual (Appendix A), which was adapted from Ren et al.'s (2022) investigation of parent praise, and coded the same three videos to establish baseline agreement. Coders read through each transcript, marking each instance in which a mother or child made a statement that referenced how *hard* or *easy* a task was to complete, including statements that used synonyms for these words (for example, "challenging" or "tricky"). Statements that used *hard* and *easy* words to talk about force (e.g., "Don't hit it so hard – it will break") or a physical property of an object (e.g., "The corn is too hard") were not coded. After manually identifying all difficulty language, research assistants also ran an automated script that flagged any statements that included the words "easy", "hard" or synonyms, then manually checked any flagged statements that had not already been coded to determine if they should be included.

After reading through the entire transcript, coders returned to each marked statement and recorded five dimensions of each statement, in order to characterize the content of parent and child relative difficulty statements (see Table 1 for examples of each category). These dimensions included 1) the valence of the statement (was it about a task being "hard" or a task being "easy"), 2) whether the statement referenced an ongoing or past event versus a future event (e.g., "That *was* hard" versus "That *will be* hard"), 3) whether the statement explicitly referenced someone or not (e.g., "That was easy *for you*" versus "That was easy"), and 4) whether or not the statement referenced a physical feature, action, or rule of a task (e.g., "It'll be easy to rotate and

fit those pieces together" versus "It'll be easy"). Twenty percent of the transcripts in the dataset were double-coded. To calculate inter-rater reliability, we compared the primary and secondary coders' determinations for whether each statement referenced difficulty, and their agreement on each dimension of the difficulty statements and calculated Cohen's kappa for each dimension. Reliability was high, with a median Cohen's kappa between .96 and .97 for each dimension for mother and child speech.

Table 1

Mean Number of Difficulty Statements per 1000 Utterances by Speaker Across Tasks

		Study 1		Study 2			
	Definitions and Example Utterances	Child Utterances	Mother Utterances	Child Utterances (with father)	Child Utterances (with mother)	Father Utterances	Mother Utterances
		(n=84)	(n=84)	(n=76)	(n=104)	(n=76)	(n=104)
		M(SD)					
Total		0.91(1.19)	1.30(1.67)	9.30(11.85)	9.71(14.22)	6.75(7.22)	5.07(6.52)
Valence	References "easy", "hard" or comparison statement						
Hard	*"Wow this is tough"*	0.66(1.14)	0.88(1.39)	4.55(8.38)	6.40(11.43)	4.55(5.56)	3.78(5.79)
Easy	*"That was easy!"*	0.25(0.53)	0.42(0.75)	4.75(9.20)	3.31(6.52)	2.20(3.54)	1.28(2.66)
Timing	References future versus ongoing or past event						
Expectation	*"This one'll be easy!"*	0.12(0.36)	0.17(0.41)	3.29(5.99)	3.16(6.32)	3.21(4.51)	2.41(3.64)
Feedback	*"That was really easy for you"*	0.77(1.16)	1.12(1.61)	6.01(10.84)	6.55(11.43)	3.55(5.33)	2.65(4.67)
Referent	References the child, parent, dyad, or other person, or is ambiguous						
Present	*"This isn't going to be easy for us"*	0.20(0.77)	0.54(0.90)	0.89(2.78)	0.71(2.38)	2.85(5.15)	1.70(3.93)
Absent	*"That's tough"*	0.70(1.00)	0.76(1.22)	8.40(10.91)	9.00(13.77)	3.90(5.08)	3.37(4.77)
Specificity	References a physical feature, action, or rule of task or is ambiguous						
Feature-specific	*"It's going to be hard to make those lines here"*	0.20(0.98)	0.43(1.03)	0.51(2.00)	0.26(1.57)	2.05(4.24)	1.31(2.83)
General	*"That was hard!"*	0.70(0.83)	0.85(1.09)	8.78(11.37)	9.46(13.69)	4.70(5.10)	3.76(5.39)

Dropped Cases

The number of participants varied by assessment point (total of 5 assessment points) and by task (12 total tasks, between 2 and 3 tasks per assessment) due to attrition as well as compliance in recording and returning the meal-time recordings. We included all participants who completed at least one task; the average number of tasks per child was 8.19 (SD = 3.38). We only included tasks with the target child and the mother, and as a result, excluded seven tasks from five children where another caregiver was present instead of the mother .

Analytic Plan

We estimated the relation of child age, child gender, and task to mothers' and children's frequency of difficulty language by running three models to examine whether those three variables predicted *easy* and *hard* talk together, only *hard* talk, and only *easy* talk. We used each speaker's mean total utterances across all tasks, as well as their total utterances in each task with their mean total utterances overall subtracted, to equate for overall amount of talk. Our longitudinal models used generalized linear mixed-effects modeling with random intercepts for each child. We did not include random slopes of age in these models, because preliminary analyses indicated that there was almost no between-child variability in the effect of age. We used a Poisson distribution link, which is appropriate for our dependent variable, utterance counts, which is a form of discrete, count data (Karlis & Xekalaki, 2000). We conducted sensitivity analyses to determine the minimum detectable effect size for our analyses, based on our sample size of 84, power = .80, and $\alpha = .05$. For our correlational analyses, the minimum detectable effect size was $|r| = .215$. For our generalized linear mixed-effects models, we estimated power based on a linear multiple regression with four predictors, resulting in a minimum detectable effect size of $f^2 = .15$. We conducted attrition analyses and found that child

and mother person-mean-centered total speech, child gender, and child age did not significantly vary between children with data for all twelve tasks (n=14) and those with data for fewer than twelve tasks (n=70).

Study 1 Results

Frequency and Range of Statements

We first determined whether and how frequently mothers and children spontaneously talked about how *easy* or *hard* tasks were to complete. We summed mother speech across all tasks and time points and did the same for child speech. We found that 60% of mothers (range: 0-9 statements) and 55% of children (range: 0-5 statements) made at least one *easy* or *hard* statement. To account for the variation in the number of tasks that participants completed, we also looked at the number of difficulty statements as a percentage of total utterances across all tasks completed: .13% (SD = .17) of mother utterances and .09% (SD = .12) of child utterances were difficulty talk. We conducted a generalized linear mixed effects model to see if mother difficulty talk was correlated with child difficulty talk. This analysis included all available tasks for each family and estimated the overall within-task relation of mother talk to child talk, including a random intercept for each family. Mother difficulty talk was significantly related to child difficulty talk (B = .49, SE = .11, $p < .001$). In short, many mothers and children talked about task difficulty, with a limited range of statements, although some mothers and children never referenced this concept.

Characterizing Mothers' and Children's Difficulty Language

We next investigated the content of difficulty statements by categorizing each statement along five dimensions (Table 1).

Mother Talk

Descriptively, the most common type of mother statement referenced either how *hard* or *easy* the task was to complete, did not have an explicit verbal referent and did not reference a specific feature of the task (41.46% of mother difficulty statements, SD = .40; see Table 1). Directionally, mothers talked about the relative difficulty of past and present events (M = 1.12 feedback utterances per 1000 utterances, SD = 1.61) more than future events (M = .17 expectation utterances per 1000 utterances, SD = .41).

To determine whether a mother who used one type of language was more or less likely to use another type, we also examined the correlations between the mutually exclusive sub-codes within each category. Mothers' *easy* and *hard* statements ($r_s(82) = .25$, $p = .024$), mothers' expectation and feedback difficulty statements ($r_s(82) = .25$, $p = .019$), their referent and no referent difficulty statements ($r_s(82) = .31$, $p = .004$), and their feature-specific and general statements ($r_s(82) = .38$, $p < .001$) were all positively correlated.

Child Talk

Descriptively, children's most common statements referenced either how hard or easy a task were to complete, did not have a verbal referent, and did not reference a specific feature of the task (73.15% of child difficulty statements, SD = .40) (see Table 1). Directionally, children talked about the relative difficulty of past and present events (M = .77 feedback utterances per 1000 utterances, SD = 1.16) more than future events (M = .12 expectation utterances per 1000 utterances, SD = .36). We again examined the correlations between mutually exclusive sub-codes, to see if children tended to use one kind of difficulty language versus another. Unlike parents, children's *easy* and *hard* statements ($r_s(82) = .01$, $p = .957$), general difficulty and feature-specific difficulty statements ($r_s(82) = -.02$, $p = .877$), expectation and feedback

statements ($r_s(82) = .12$, $p = .337$), and referent and no referent difficulty statements ($r_s(82) = .21$, $p = .053$) were also not correlated for children.

Table 2

Study 1: Generalized Linear Mixed Effects Models with Mothers' and Children's Easy and Hard Talk as Outcome (N = 84)

Variable	Mothers' Easy and Hard Utterances (n=84) Model 1	Mothers' Easy Utterances (n=84) Model 2	Mothers' Hard Utterances (n=84) Model 3	Children's Easy and Hard Utterances (n=84) Model 4	Children's Easy Utterances (n=84) Model 5	Children's Hard Utterances (n=84) Model 6
	B(SE)					
Child gender (reference: female)	.21(.22)	.18(.34)	.24(.29)	-.25(.23)	.16(.48)	-.43(.30)
Mean child age	-.00(.00)	.01(.01)	-.02(.01)*	.01(.01)	.00(.01)	.01(.01)
Task – Letter Writing (reference: Magnet Game)	.04(.28)	-.28(.42)	.37(.37)	-.64(.40)	.44(.60)	-1.46 (.64)*
Task – Meal Time (reference: Magnet Game)	-.86(.28)**	-.54(.41)	-1.07(.38)**	-.78(.31)*	-1.43(.69)*	-.59(.36)
Task – Toy Play (reference: Magnet Game)	-.36(.29)	-.40(.47)	-.47(.37)	-.39(.38)	-.86(.77)	-.26(.43)
Person-mean total speech	.08(.02)***	.10(.03)***	.08(.02)***	.06(.02)**	.05(.05)	.07(.03)*
Person-mean-centered total speech	.05(.01)***	.03(.01)**	.06(.01)***	.06(.01)***	.09(.02)***	.06(.01)***

*$p < .05$, **$p < .01$, ***$p < .001$

Note: These models use a Poisson link and random intercepts for child.

Stability in Families' Difficulty Talk Over Time

Given the longitudinal nature of the Study 1 dataset, we were able to look at the stability of mother and child easy and hard talk over time (Table 3). Due to the restricted range of these statements, we dichotomized the outcome variable into speakers who made one or more easy or hard statements at a given time point and those who made no such statements.

Mother Talk

Mother easy statements at the 4-year assessment were positively correlated with mother easy statements at the 5-year assessment ($r(82) = .55$, $p < .001$) and mother hard statements at the 3-year timepoint were positively correlated with mother hard statements at the 4-year time point ($r(82) = .31$, $p = .013$). No other correlations between adjacent assessment points were significant (Table 3).

Child Talk

We found that child easy and hard statements at the 2nd grade assessment were positively correlated with these statements at the 4th grade assessment, which were driven by child hard statements (easy and hard together: $r(82) = .29$, $p = .032$, hard only: $r(82) = .32$, $p = .020$).

Table 3

Study 1: Mother and Child Difficulty Talk Correlated Across Time

Variable	Mother Talk				Child Talk			
	3-4 years	4-5 years	5 yrs – 2nd gr	2nd gr – 4th gr	3-4 years	4-5 years	5 yrs – 2nd gr	2nd gr – 4th gr
Easy/Hard	.20	.22	.09	.00	.13	-.06	-.07	.29*
Easy Only	-.09	.55***	.19	.02	-.03	-.04	-.07	-.10
Hard Only	.31*	.01	.05	-.03	.04	-.14	.10	.32*

* $p < .05$, ** $p < .01$, ***$p < .001$

Variables that Predict Easy and Hard Production: Child Gender and Age

We ran six generalized linear mixed effects models, three with mothers' difficulty language as the dependent variable and three with children's difficulty language as the dependent variable. We first modeled easy and hard language combined, then easy language only, and finally hard language only. We included child gender, child age, and task as predictors and person mean total utterances and person-mean-centered total utterances as covariates (Table 2).

Mother Talk

Neither child gender or child age was associated with the number of mother *easy* and *hard* statements (Table 2, Model 1), and the same was true for *easy* only statements (Table 2, Model 2). However, child age was significantly associated with the number of *hard* statements made by mothers, with mothers making fewer *hard* statements as children got older (B= -.02, SE = .01, p = .019). Task was sometimes correlated with the number of *easy* and *hard* statements: mothers used fewer *easy* and *hard* statements during the Meal Time task compared to the Magnet Game task, which seemed to be driven by their *hard* statements (B = -.86, SE = .28, p = .002; only hard B = -1.07, SE = .38, p = .005) (Table 2, Models 1 and 3)

Child Talk

Similar to mothers, child gender and age was not correlated with the number of child *easy* and *hard* statements (Table 2, Models 4, 5, and 6). Like mothers, task was associated with children's *easy* and *hard* statements: children used fewer *easy* and *hard* statements during the Meal Time task than during the Magnet Game task (B = -.78, SE = .31, p = .013, Table 2, Model 4). Specifically, children made fewer *easy* statements in the Meal Time than Magnet Game task (B = -1.43, SE = .69, p = .038; Table 2, Model 5). Furthermore, children made fewer hard

comments in the Letter Writing task than in the Magnet Game task (B = -1.46, SE = .64, p = .022; Table 2, Model 6).

Study 1 Discussion

Study 1 allowed us to confirm that young children and their mothers do talk about task difficulty (though there is interesting variation), that contextual and person-level factors influence how much they do so, and that this talk changes over time. However, there were several limitations of Study 1. First, the dataset did not allow us to examine the role of parent gender in difficulty language production because participating parents were overwhelmingly mothers. We were also not able to examine the relationship of demographic characteristics, specifically family income-to-needs ratio and parent education, to difficulty talk because these data were not available. Although Study 1 did not include person-level demographics information, families were all low SES, so our findings from this study may not generalize to higher SES families.

In the Study 2 dataset, we were able to address these limitations and expand our investigation of difficulty language. First, we were able to examine both mothers' and fathers' difficulty talk in separate interactions with their children, and were also to include family income-to-needs ratio and parent education in our analyses. Study 2 also allowed us to examine parent and child difficulty talk in more constrained, goal-directed task contexts that were designed by the original researchers to be challenging for children to complete on their own. Finally, we were able to look at the relationship between parent difficulty talk and parent praise, which previous work shows is related to children's motivational beliefs and behaviors, as well as global parent and child behavior during the sessions.

Study 2 Methods

Data Source

In Study 2, we examined the 1st grade mother-child and father-child interactions from one site of the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (SECCYD; NICHD Early Child Care Research Network, 2001). Children were recruited into the NICHD SECCYD study in 1991 from hospitals at ten sites throughout the United States, There were 136 child participants from the Philadelphia site at the start of the study. At this site, mothers giving birth to healthy infants in three different hospitals (two urban teaching hospitals and one suburban hospital) were approached during selected 24-hour periods, and a random subset of the mothers who met eligibility criteria and gave consent were phoned two weeks later about participation in the study. In a home visit where the study was explained in more detail, families who consented were enrolled in the study (NICHD Early Child Care Research Network, 2003). The purpose of the initial study was to examine the effect of different early childcare experiences on children's later development and educational outcomes. Data for Study 2 comes from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development and are archived on the Interuniversity Consortium for Political and Social Research (ICPSR) website. These data can be accessed by researchers through the ICPSR approval process (https://www.icpsr.umich.edu/web/ICPSR/series/233). The study was determined to not be research involving human subjects by the Temple University Institutional Review Board (Protocol 24308: Early childhood interactions and later STEM achievement and attitudes). Data were analyzed using R, version 4.1.3 (R Core Team, 2022) and the package *tidyverse*, version 1.3.1 (MIT, 2021). This project's design and analysis were not pre-registered.

Participants

In the SECCYD dataset for this site, 107 families (79% of the sample recruited at the one-month home visit) completed at least one of the first-grade parent-child interactions with their mother, father, or stepfather. (We excluded interactions where the child played with a person other than their mother, father, or stepfather.) One hundred and four children completed a session with their mother (M_{age}(SD) = 7.13(.35) years), and 76 children completed a session with their father or step-father (M_{age}(SD) = 6.67(.35) years). Most children (n=74) completed a session with both their mother and father. Fifty-four percent of the children were girls. According to parent report at study enrollment, 72% of the children were White, 23.4% were Black or African-American, 0.9% were Asian or Pacific Islander, and 3.7% reported another race/ethnicity. The highest level of education completed by one parent at the first-grade session included some high school (2%), completion of high school or GED (10%), some college/vocational school (23%), bachelor's degree (31%), and post-undergraduate education (34%). For each family, a ratio of income to needs was created by dividing family income when children were 6, 24, 36, 54 months and at first grade by the poverty threshold for their household size (M(SD) = 4.41(2.95), range = .20 – 17.19).

Procedure

Each child completed a 15-minute video-taped session with their mother in the lab and another 15-minute videotaped session with their father or step-father in their family's home. During these sessions, parents were instructed to collaboratively complete Etch-a-Sketch drawings, allow the child to independently build 3-D block designs (with fathers) or 2-D block designs (with mothers) to match a target image, and play a competitive card game with a simple rule (e.g., slapping the deck when a Jack was drawn). Mother-child interactions were videotaped from behind a two-way mirror, and father-child interactions were videotaped by an experimenter

in the home. The three tasks that parents and children completed in the SECCYD study were chosen by the original research team to be challenging for children to complete on their own.

Parent and Child Language Coding

First, parent and child speech were transcribed from the videotaped interactions by the current research team using Datavyu (Datavyu Team, 2014). Speech was separated into utterances – defined as a word, short phrase, or sentence – and 20% of videotapes were transcribed by a second coder to establish reliability at both the word and utterance level. Transcribers resolved disagreements when agreement was under 85%. The median Cohen's kappa was .86 at the word level and .91 at the utterance level. A separate set of research assistants then coded each transcript for difficulty language using the same coding manual (see Appendix A) and procedure as Study 1. Twenty percent of the transcripts were coded by a second person and reliability was high, with a median Cohen's kappa between .89 and 1.00 for each dimension of parent and child speech. We also examined parent praise, which had been previously coded by our lab and reported in Ren et al. (2022). Parent praise was coded using a scheme developed by Gunderson et al. (2013), which included person praise (statements like "You're so smart") and process praise (statements like "You worked hard on that"). Twenty percent of videos were double-coded with a median Cohen's kappa of .90 (as reported in Ren et al., 2022).

Parent Interaction Ratings

Observers from the original SECCYD research team rated parent and child behavior along several global dimensions, including child agency, child negativity, parent stimulation of cognitive development, and parent and child goal-directed partnership. Child agency represented the extent to which children exerted effort to complete the goals of the task, scored from 1 (very

low; child displays no agency) to 7 (very high; child shows high agency). Child negativity reflected whether the child became angry, hostile or frustrated with the parent, from 1 (very low; child has consistently positive interactions with the parent) to 7 (very high; child was repeatedly and explicitly angry or resistant to the parent). Parent stimulation of cognitive development captured the extent to which parents engaged in intentional teaching behaviors that were appropriate to a child's current skill level and promoted child learning, scored from 1 (very low; parent provides no cognitive stimulation) to 7 (very high; parent stimulates higher level of mastery, understanding or sophistication). Goal-directed partnership reflected how the parent and child created and sustained common goals within the play session, including whether they changed goals to avoid child frustration, rated from 1 (very low; child and parent do not collaborate and parent allows child to change tasks at first sign of frustration) to 7 (very high; parent calibrates behavior to child and they collaborate to achieve goals) (Egeland & Hiester, 1993; Pianta, 1994); adapted by Owen and Ware for NICHD SECCYD, 1996).

Dropped Cases

We dropped data from 10 tasks that lasted less than two minutes, to prevent these unusually brief interactions from skewing the data (this approach matches Ren et al., 2022).

Analytic Plan

We used generalized linear mixed-effects models to examine whether child gender, parent gender, parents' highest educational level attained (across both parents), mean income-to-needs ratio for the first five time points of the SECCYD study, and task predicted the number of difficulty statements that children and parents produced, controlling for each speakers' mean total utterances across all tasks, as well as their total utterances in each task with mean total utterances overall subtracted. We examined all difficulty talk together as a dependent variable,

and also ran separate models with only easy and only hard language as the dependent variables. In all models, we used a Poisson link distribution, which was appropriate given that outcome variables were count data, and we used a random intercept for each child. In addition, we examined whether global behavior codes recorded by the original research team, as well as parent praise, predicted particular types of parent and child difficulty language using separate generalized linear models, also with a Poisson distribution. We conducted sensitivity analyses to find the minimum detectable effect size in our analyses given sample size = 107, power = .80 and $\alpha = .05$. For our correlational analyses, the minimum detectable effect size was $|r| = .19$. For the generalized linear mixed-effects models, we estimated power based on a linear multiple regression with six predictors, we have a minimum detectable effect size of $f^2 = .14$.

Study 2 Results

Frequency and Range of Statements

We again examined whether parents and children spontaneously produced *easy* and *hard* statements. For each speaker (mother, father, child), we summed speech across the three tasks at the 1st grade interactions and found that 70% of fathers (range: 0-7 statements), 55% of mothers (range: 0-8 statements), 58% of children with their fathers (range: 0-9 statements), and 45% of children with their mothers (range: 0-7 statements) made at least one *easy* or *hard* statement. Parents' number of easy and hard statements were positively correlated with their children's number of statements (mother-child correlation: $r_s(102) = .23$, $p = .022$; father-child correlation: $r_s(74) = .25$, $p = .034$). Difficulty talk made up a descriptively higher proportion of total talk than in Study 1: .51% (SD = .65) of mother utterances, .68% (SD = .72) of father utterances, .97% (SD = 1.42) of child utterances with mothers, and .93% (SD = 1.18) of child utterances with fathers were difficulty talk.

Characterizing Parents' and Children's Difficulty Talk

Parent Talk

Similar to Study 1, descriptively, the most common type of difficulty statement made by parents referenced either how hard or easy the task was to complete, did not have an explicit verbal referent, and did not reference a specific feature of the task (Table 1). Among fathers (n=53) and mothers (n=57) who used at least one difficulty statement, this type of statement constituted 51.73% (SD = .40) of all father difficulty statements and 52.32% (SD = .43) of mothers' difficulty statements. Directionally, and unlike mothers in Study 1, parents' statements referenced the present or past as well as the future with similar frequency.

We again examined the correlations between the mutually exclusive sub-codes within each category. We found that fathers who used more *easy* statements also used more *hard* statements ($r_s(74) = .28$, $p = .013$); however, this was not the case for mothers, for whom there was no significant relation ($r_s(102) = .09$, $p = .371$). Mothers who used more statements *with a referent* also tended to use more statements *without a referent* ($r_s(102) = .22$, $p = .026$), but this was not the case for fathers ($r_s(74) = .07$, $p = .559$).Further, for both mothers and fathers, parents who used more *general* difficulty statements also used more *feature-specific* difficulty statements (fathers: $r_s(74) = .28$, $p = .013$, mothers: $r_s(102) = .17$, $p = .079$). Similarly, mothers' use of *expectation* statements was positively related to their use of *feedback* statements ($r_2(102) = .33$, $p < .001$), but these were not related among fathers ($r_s(74) = .04$, $p = .701$).

Child Talk

As in Study 1, children were most likely to make statements referencing either how "hard" or "easy" a task was without a verbal referent and without referencing a specific task feature (Table 1). Of children who produced at least one difficulty statement while interacting

with their fathers (n=43) or mothers (n=47), these general statements made up 88.81% (SD = .25) of their difficulty statements with fathers and 88.76% (SD = .24) of their difficulty statements with mothers. Descriptively, and unlike parents, children tended to talk more about the present or past than the future when referencing task difficulty (see Table 1).

We found that children who used more *easy* statements with their mothers also used more *hard* statements ($r_s(102) = .32$, $p = .001$), but this was not the case when children were interacting with their fathers ($r_s(74) = -.10$, $p = .393$). Children who used more statements *with a referent* also tended to use more statements *without a referent* with their mothers ($r_s(102) = .21$, $p = .029$), but this relationship did not hold when they were interacting with their fathers ($r_s(74) = .17$, $p = .154$). Further, children who used more *general* difficulty statements also used more *feature-specific* difficulty statements with their mothers ($r_s(102) = .26$, $p = .008$), but this correlation was not significant while interacting with their fathers ($r_s(74) = .20$, $p = .083$,). Similarly, children's use of *expectation* statements was related to their use of *feedback* statements with mothers ($r_s(102) = .39$, $p < .001$), whereas children's use of *expectation* and *feedback* statements with their fathers was not correlated ($r_s(74) = .01$, $p = .951$).

Variables that Correlate with Difficulty Language Production: Gender, Income, Parent Education, and Task

We next examined whether relatively stable features of children and parents – gender, income, and parent education – and transient features of the parent-child interaction -- parent and child affect, behavior (Table 4), and other motivationally-relevant talk during the tasks correlated with how often parents and children talked about task difficulty.

Table 4

Study 2: Generalized Linear Mixed Effects Models with Parents' and Children's Easy and Hard Talk as Outcome (N=107)

	Parents' Easy and Hard Utterances	Parents' Easy Utterances	Parents' Hard Utterances	Children's Easy and Hard Utterances	Children's Easy Utterances	Children's Hard Utterances
	(n=107)	(n=107)	(n=107)	(n=107)	(n=107)	(n=107)
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	B(SE)					
Child gender (reference: female)	.11(.18)	-.19(.27)	.25(.21)	.37(.23)	.31(.33)	.41(.29)
Parent gender (reference: female)	.22(.13)	.52(.24)*	.09(.16)	-.13(.16)	.26(.24)	-.39(.21)
Maximum parent education	.06(.05)	.03(.07)	.08(.06)	.11(.06)	.04(.08)	.15(.07)*
Mean income to needs ratio	.06(.04)	.04(.05)	.06(.04)	-.03(.05)	.01(.07)	-.06(.06)
Task – cards (reference: blocks)	-1.47(.24)***	-.67(.31)*	-2.34(.43)***	-4.65(1.01)***	-3.10(1.01)***	-
Task – etch a sketch (reference: blocks)	-.01(.14)	-.47(.26)	.16(.17)	-.78(.18)***	-1.64(.35)***	-.38(.21)
Person-mean total speech	-.01(.04)	.03(.05)	-.03(.04)	.26(.07)***	.33(.10)**	.22(.09)*
Person-mean-centered total speech	.12(.02)***	.10(.02)***	.11(.02)***	.13(.04)***	.10(.06)	.14(.04)**

*$p < .05$, **$p < .01$, ***$p < .001$

Note: These models use a Poisson link and random intercepts for child.

Parent Talk

Task was significantly correlated with the number of *easy* and *hard* statements for parents (B = -1.47, SE = .24, p < .001), who talked more about difficulty in the block building task than the cards task (Table 4, Model 1). Parents' difficulty language was not correlated with child and parent gender, families' average income-to-needs ratio over the first five assessment points of the SECCYD study, and parents' education level (Table 4, Model 1). Similarly, when examining parents' *easy* talk (Table 4, Model 2), parent gender predicted the number of parents' *easy* statements specifically, with fathers making more of these statements than mothers (B = .52, SE = .24, p = .03; Wald $X^2(1) = 4.62$, p = .03). Child gender, family income-to-needs ratio, and parent education were not associated with parents' easy talk (Table 4, Model 2). When predicting parents' *hard* statements (Table 4, Model 3), no predictors were significant (child and parent gender, income-to-needs ratio, maximum parent education, and task).

We next tested our prediction that parents' *feature-specific* easy and hard statements would relate to parents' stimulation of cognitive development. In partial support of this, mothers' use of *feature-specific hard* statements was positively associated with their stimulation of cognitive development, after controlling for total number of utterances, but this association was not the case for fathers (mothers: B = .32, SE = .16, p = .043, fathers: B = -.07, SE = .17, p = .677).

We also predicted that parents' feature-specific language would relate to their use of process praise. Our results partially supported this prediction. Frequency of mothers' (but not fathers') feature-specific statements was positively correlated with their process praise (mothers: B = .30, SE = .09, p < .001; fathers: B = .06, SE = .08, p = .426).

Child Talk

We next examined predictors of children's easy and hard talk (Table 4, Model 5). Task was associated with the number of *easy* and *hard* statements children made (Wald $X^2(2)$ 38.35, $p < .001$), with children producing more such statements in the block building and Etch-a-sketch tasks than the cards task. Parent gender, child gender, families' average income-to-needs ratio, and parents' education were not correlated with children's *easy* and *hard* talk. Focusing on children's *easy* statements (Table 4, Model 5), task influenced children's easy statements in the same direction as *easy* and *hard* statements together (Wald $X^2(2) = 34.46$, $p < .001$). Parent gender, child gender, families' income-to-needs ratio did not significantly correlate with children's *easy* statements. Similarly, these variables were not correlated with children's *hard* statements (Table 4, Model 6), with the exception of parents' education, where children whose parents had more education produced a greater number of *hard* statements ($B = .15$, $SE = .07$, $p = .03$; Wald $X^2(1) = 4.53$, $p = .03$.

We next examined our predictions that global interaction ratings for child negativity, agency, and goal-directed partnership would be associated with children's use of *general* (rather than feature-specific) *hard* language, controlling for total number of utterances (Table 5). Contrary to our predictions, these relations were not significant (ps > .05) with one exception: children with higher agency during the session with their mothers produced fewer hard statements ($B = -.22$, $SE = .11$, $p = .039$). Somewhat surprisingly, children who expressed frustration and negative affect during the interaction did not say that the tasks were "hard" more frequently. Similarly, children with very goal-directed behavior and who collaborated effectively with their parent did not say that tasks were "hard" less frequently.

Table 5

Study 2: Generalized Linear Models with Global Behavior Codes Predicting Children's Hard Talk (N=107)

	Child Hard Talk with Mothers (n=103)	Child Hard Talk with Fathers (n=75)	Child Hard Talk with Mothers (n=103)	Child Hard Talk with Fathers (n=75)	Child Hard Talk with Mothers (n=103)	Child Hard Talk with Fathers (n=75)
Variable	Model 1		Model 3	Model 4	Model 5	Model 6
				B(SE)		
Goal Directed Partnership	-.12(.09)	.19(.18)				
Child Agency			-.22(.11)*	.02(.18)		
Child Negativity					-.05(.12)	-.20(.22)
Total Utterances	.01(.00)*	.01(.00)***	.01(.00)**	.01(.00)***	.16(.08)*	.13(.05)**

*p < .05, **p < .01, ***p < .001

Note: These models use a Poisson link and random intercepts for child.

Study 2 Discussion

Overall, the patterns of frequency and content of parents' and children's talk about difficulty in Study 2 were consistent with those found in Study 1, with a few exceptions, specifically that boys in Study 2 produced more "hard" statements than girls during the spatial tasks, and task seemed to more reliably influence families' difficulty talk in Study 2 than in Study 1. Further, the Study 2 dataset allowed us to extend the investigation of contextual features that influence talk about difficulty to include parent gender, family demographics, parent praise, and additional global ratings of parent and child interaction qualities. Income-to-needs ratio and parent education were mostly not associated with parents' and children's difficulty talk, with the exception that children of parents with greater education were more likely to talk about how "hard" tasks were. However, mothers and fathers showed some differences from one another in in their talk about difficulty: first, fathers were more likely to talk about how "easy" tasks were to complete than mothers. Second, partially consistent with our prediction, mothers' use of process praise was positively correlated with their use of feature-specific difficulty talk, suggesting that some mothers tended to emphasize the importance of malleable effort in both their praise and their difficulty talk. Supporting this possibility, mothers who demonstrated higher levels of cognitive stimulation while interacting with their child talked more about the features and process of tasks making them challenging. Finally, children who displayed higher agency during sessions with their mothers were less likely to talk about how "hard" the tasks were to complete. In sum, Study 2 confirmed that many families talk about task difficulty, giving us additional insight into what task features could influence whether and how frequently this kind of talk happens, and that parent and child gender interact in surprising ways to influence difficulty language production.

General Discussion

The present study offers descriptive evidence about the frequency and variability of parents' and children's talk about how "hard" and "easy" tasks are to complete. In particular, like other motivationally-relevant talk (e.g., parent praise, Gunderson et al., 2013; Ren et al., 2022), difficulty talk is relatively low frequency and shows variability between families. In terms of the content of their difficulty talk, parents and children were most likely to talk about task difficulty very generally, making statements like "That's hard!" or "That was easy", without including explicit verbal content about what made those tasks easy or hard to complete. The prevalence of general difficulty statements is similar to findings on parent praise, another type of parent talk that is associated with children's challenge-seeking. A prior study of naturalistic parent praise found that general statements like "Great!" made up 66% of parent praise, whereas the more-specific process praise made up only 18% of praise statements (Gunderson et al., 2013). In the present studies, feature-specific difficulty language (e.g., "It's going to be hard to make those lines here") was relatively low-frequency as well. Importantly, in other studies, even lower-frequency process praise had significant motivational consequences – children who heard more process praise in early childhood reported greater enjoyment and pursuit of challenging tasks in 2nd grade (Gunderson et al., 2013), which was further associated with better academic performance (Gunderson et al., 2018). This suggests that even relatively low-frequency types of difficulty language, like feature-specific language, may impact children's persistence and challenge-seeking.

In addition to both being less commonly-used than their "general" counterparts, process praise and feature-specific difficulty language are conceptually related: both types of talk emphasize the importance of task-relevant processes and strategies in leading to outcomes. In

Study 2, we found an empirical connection between these types of talk, such that mothers who produced more difficulty statements that emphasized the role of task features also made more process praise statements, suggesting a tendency of some mothers to emphasize processes, across both their praise and difficulty language. Further, mothers who used more feature-specific "hard" statements also demonstrated greater cognitive stimulation during the session. Together, these results suggest that some mothers' style of interaction was oriented toward motivating the child's cognitive engagement with the task, which was consistent in those mothers' use of difficulty language, praise, and overall cognitive stimulation at a global level.

We also explored the task and demographic characteristics that relate to frequency of difficulty language. Difficulty talk was differentially elicited depending on the task families were engaged in, with the highest frequency of difficulty talk occurring during challenging goal-directed tasks (the block-building and Etch-a-Sketch tasks in Study 2) and the lowest frequency during mealtimes (Study 1). We found no relations between difficulty talk and family income, and only one relation to parent education: in Study 2, higher parent education was associated with greater "hard" talk from children only, which could reflect a difference in children's likelihood of recruiting parents' help with challenging tasks. Contrary to our predictions, we found that child gender was not associated with either child or parent difficulty talk in either study. We did find one parent gender difference in Study 2: fathers talked about how "easy" tasks were more frequently than mothers did. To the extent that "easy" could be interpreted as an inverse of "hard", fathers' greater easy talk may provide partial support of our hypothesis that mothers' stereotype threat related to spatial tasks could be reflected in their difficulty talk. Given the lack of a relationship between parent gender and "hard" talk, this interpretation should be taken with caution. Together, these studies provide descriptive evidence that can be used to

support further research on the correlational and causal relationships between difficulty talk and children's challenge-seeking, persistence, and academic performance.

Limitations and Future Directions

Although the present study provides important descriptive and correlational information about whether and how families talk about task difficulty, our conclusions are limited by features of the study designs of these existing datasets. In particular, tasks were not completely matched across timepoints (Study 1) and between caregivers (Study 2), which makes it challenging to determine why differences in difficulty talk between tasks, timepoints, and caregivers occurred. In Study 2, our ability to make direct comparisons across mother-child and father-child interactions is also limited because mothers completed the interaction in the lab and fathers completed the interaction in the home. Furthermore, parents were given different instructions for the amount of help they should give their children in different tasks – the Etch-a-Sketch task was to be completed collaboratively, whereas the Blocks task was to be done more independently by the child. Future studies could control for task, task instructions, and context (lab or home) when examining parent and child difficulty talk in order to isolate the particular contextual features that shape children's and parents' talk about difficulty.

Second, we designed our qualitative coding scheme as a first step towards understanding if, when, and how children and parents talk about task difficulty. We selected dimensions of difficulty talk that aligned with dimensions of previously studied parent praise because we thought this could be a theoretically and functionally related type of parent talk. However, our coding scheme does not capture all aspects of the complex conversational and behavioral contexts in which parents and children talk about task difficulty. For example, parents could make a general difficulty statement – "That's hard!" – followed by with either "But we like hard

things" or "Let's do something else" to communicate two very different messages about challenge and persistence. These surrounding statements, while not part of the difficulty statement itself, may be very important for shaping children's motivational behaviors. Beyond talk, parents could convey messages about difficulty with their gestures or behaviors (e.g., taking over when a child struggles, Leonard et al., 2021) in ways that also shape children's persistence. Future work could investigate additional aspects of parents' behaviors and motivational messages that surround their difficulty talk.

Finally, we completed this project to determine whether feature-specific, person-specific, and general difficulty talk are ecologically valid types of talk for families with young children. A crucial next step will be to explore what effect adults' difficulty talk has on children's challenge-seeking and persistence, especially after experiencing set-backs. For example, using an experimental paradigm similar to what has been used in the praise literature (e.g., Cimpian et al., 2007; Mueller & Dweck, 1998; Li & Bates, 2019), we could give children "person-specific easy" feedback ("It must have been an easy puzzle for you") or "feature-specific easy" feedback ("It must have been easy to rotate and fit those pieces together") after success on a task, and then see if this feedback makes children more or less likely to pursue a challenging task after they experience a failure.

Conclusion

In conclusion, many parents and children spontaneously talk about how "easy" and "hard" tasks are to complete during a range of task contexts, and variability between families exists. Task context influences frequency of difficulty talk, and in one dataset, we found that child gender, parent gender, and parent education did as well. We suggest that future work should experimentally manipulate types of difficulty language to determine its effect on

children's challenge-seeking. Importantly, this study provides a first step towards understanding what inputs support children's emerging understanding of difficulty, and, in turn, the challenge-seeking and persistence behaviors that support their learning.

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Appendix A: Coding Scheme for Studies 1 and 2

For Study 1, transcripts were retrieved from the CHILDES database. Trained research assistants determined whether each utterance referenced difficulty. If it did, they then assigned mutually exclusive codes which mapped onto four categories: whether the utterance referred to a specific person or lacked a referent ("Referent/No Referent"), whether the utterance referred to an event in the past or present versus the future ("Timing"), whether the utterance referred to something being "easy" or "hard" ("Valence"), and whether the utterance referred to a specific feature of a task as the reason it was challenging ("Specificity").

For Study 2, the same procedure was followed, except that interaction videos were first transcribed by a separate team of research assistants (as reported in Ren et al., 2022).

Overview of the Codebook:

Code Categories	About Difficulty?	Referent/No Referent	Timing	Valence	Specificity
Descriptions	The content of the speech	Whether a statement includes a verbal referent (e.g., "you", "Mom") or not	The time (past and present versus future) that the speech is referring to.	Whether the language is about how "hard" or how "easy" the task is.	Whether the statement references a specific feature of the task or not
Levels	Difficulty: if the statement referenced something being "easy" or "hard" or a synonym of these words If not, this is left blank	-Referent: there is an explicit person referenced in the utterance -No Referent: No one is verbally referenced in the statement.	-Feedback: the utterance references something that happened in the past or present -Expectation: the utterance references something happening in the future	-Hard (or synonym) -Easy (or synonym)	-Feature-specific: utterance references a physical feature, rule or action within a task -General: utterance does not reference a specific feature of the task

Code Definitions

About Difficulty?

Levels	Description	Examples	Words that may indicate category
Difficulty	Statement captures child's/parent's expression of the difficulty (or easiness) of a task or action.	-"See how it's going to be hard to make these lines here." -"The first one we have to do is the hardest one for -- for us" -"This looks easy!" -"The hardest of all"	"hard", "harder", "hardest", "easy", "easier", "easiest", "difficult", "tough", "challenging", "tricky"
Not Difficulty	Does not meet the definition of Difficulty.	All other utterances.	Not applicable.

Timing

Levels	Description	Examples	Words that may indicate category
Expectation	-Statements referring to the child's/parent's expectation of how they, their parent, or they both together will perform in the future on a task. -Code only if it's explicitly clear that the language is referring to something in the future (this can be determined from conversational context or verb tense)	-"This one will be easy!" -"That looks easy"	-think -going to -can -can't -will -any type of future tense -seems -looks
Feedback	-Statements where child/parent comments on their own, their parent's, or both of their present or past performance on tasks.	"That was really easy for you."	-was -is -thought -any type of present or past tense

	-Often these types of language will be past or present tense and will occur during or after the task. -In cases where there is ambiguity between feedback and expectation, code as feedback.		

Valence

Levels	Description	Examples	Words that may indicate category
Easy	Instances where a task or portion of a task is described as easy or not difficult	-"That shouldn't be too hard" -"That was easy" -"Not hard at all"	Remember to check context: the statement could use a negation with "hard/difficult" to indicate "easy"!
Hard	Instances where a task or portion of a task is described as hard or difficult	-"Wow this is tough" -"I'm going to have a hard time with this" -"That wasn't easy"	Remember to check context: the statement could use a negation with "easy" to indicate "hard"!

Specificity

Levels	Description	Examples	Words that may indicate category
Feature-Specific	Instances where utterance talks about a specific physical feature, action, or rule of a task	"See how it's going to be hard to make those lines here?" "This one is easier because that thing does…" "See, this is all hard crust and that'll be easier for you to chew"	Situation dependent
General	Instances where utterance does not talk about a specific physical feature, action, or rule of a task	"That shouldn't be too hard." "I found that easily." "The English language is one of the hardest to learn."	This includes statements with no referent (e.g., "this is hard"), ones that refer to an entire task being hard/easy (e.g.,

			"Etch-a-sketch is hard") and ones that refer to an unspecified part of a task as being hard/easy (e.g., "that part was hard")