Measuring Lay Theories of Parenting and Child Development

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Abstract

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Keywords: keywords

Word count: X

Measuring Lay Theories of Parenting and Child Development

Introduction

There is a longstanding interest in individual differences in parenting behaviors, how they intersect with culture, socioeconomic status, child outcomes

Parents and caregivers play critical role in forging the environment that children develop in. As such, developmentalists have long been interested in variability in parenting behaviors and its effects on the developing child.

The array of individual parenting behaviors we observe may emerge from distinct lay parenting theories, or dimensions of belief on which people differ

The array of individual parenting behaviors we observe may emerge in part from distinct lay theories that parents hold about parenting and child development. For example, a parent who believes that children's later success will be determined by learning opportunities in infancy may spend more time speaking and reading to their infant. These theories may or may not be explicit; even implicit theories that are not articulated have been shown to determine behaviors in other domains (find examples?).

Previous research on parenting has often focused on a) parenting behaviors, e.g., Baumrind's scale authoritative/authoritarian, or b) knowledge about child development. Theories about what is BEST for children may be a related but distinct construct.

In order to test whether lay theories organize parents' thinking about parenting and child development, we sought to create a survey measure of parenting attitudes.

A lay theory framework has been used to conceptualize other types of beliefs (summarize some examples)

Can we identify distinct theories that parents differ in their endorsement of? From a methodological perspective, this would mean that people respond to a set of propositions in a way that suggests one or more distinct lay theories are driving responses to individual ideas In the present work, we identify 3 dimensions of parenting attitudes on which parents differ. We do this by generating a large set of propositions regarding parenting and child

development, and eliciting adults' agreement ratings for those propositions. We used dimension reduction techniques to identify 3 factors contributing to people's responses. We examined the propositions that loaded strongly onto each factor to better understand the underlying lay theories/attitudes that might map onto the factors. Through an iterative process, we proceeded by retaining items that loaded strongly onto one of the factors, and removing those that did not. As recommended by (), we generated more propositions that were related to those propositions that were retained. We completed 9 iterations, after which we retained 24 propositions, with 8 in each subscale.

After finalizing the structure of the survey, we sought to confirm the external validity of the measure. We did this by asking whether parents' attitudes as measured by the survey would predict their self-reported parenting behaviors or their uptake of new parenting information. We also asked whether demographic variables are associated with differences in parenting attitudes, or whether different groups (i.e., a general sample vs. parents with memberships at a children's museum) would differ in their attitudes. In the following sections, we provide more detail about the process of generating and validating the questionnaire.

There are two reasons to focus on parents' lay theories. First, parents' lay theories might be an important explanatory factor for many of the behaviors parents engage in with their child. For example, a parent who believes that building a strong emotional bond with their baby is one of the most important goals of parenting might have more physical contact with their child than a parent who does not hold this theory. Secondly, parents' lay theories may moderate the uptake of new information about parenting. It is well-established that people more easily encode new information that is consistent with an existing schema or mental model they hold (Bransford & Johnson, 1972). In addition, previous research has found that interventions on public health beliefs are more successful when they take into account people's existing belief structures in the domain (Kumar et al., 2015).

There is some evidence supporting the notion that parents' behaviors are mediated by

implicit lay theories about child development, which vary by SES and across cultures. For example, cross-cultural studies have found profound differences in how parents interact with infants. Richman, Miller, and LeVine (1992) found that mothers in the Gusii community of Kenya primarily engaged with their children to soothe them when upset, but did not often speak to them with the goal of engaging or stimulating them, as did Caucasian parents in the United States. The authors attribute this behavior to cultural conventions stemming from the belief that there is no purpose in speaking to infants, as they will not understand what is being said (LeVine, 2004; Richman et al., 1992).

There are also important differences in how parents within western cultures interact with their children. Numerous studies have identified SES disparity in the amount that parents talk to their children, which in turn predicts children's language and academic outcomes (Hoff, 2003; Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002). In an effort to identify the source of this disparity, Rowe (2008) discovered that parents' knowledge of child development (as indexed by their scores on the Knowledge of Infant Development Inventory; KIDI) predicted their child-directed language, with more knowledgeable parents speaking to their children more even when controlling for the amount of speech directed at another adult. Although this study examined parents' knowledge, and not their lay theories *per se*, it provides evidence that people's domain knowledge has real consequences for their interactions with their children.

In the following sections, we describe the process of generating scale items and initial steps towards validating the scale. To construct the scale, we followed a structured plan, generating items based on our review of the literature on parenting attitudes and practices and then using dimension reduction techniques to identify latent factors (i.e., implicit theories) driving people's responses (Clark & Watson, 1995; Furr, 2011; Simms, 2008). We then conducted a series of studies aimed at estimating ecological validity for the scale. Specifically, we asked whether people's parenting attitudes as assessed by the PAQ varied based on demographic factors, whether people's attitudes were related to their self-reported

parenting behaviors, and whether attitudes mediated people's understanding of and memory for new information about parenting and child development.
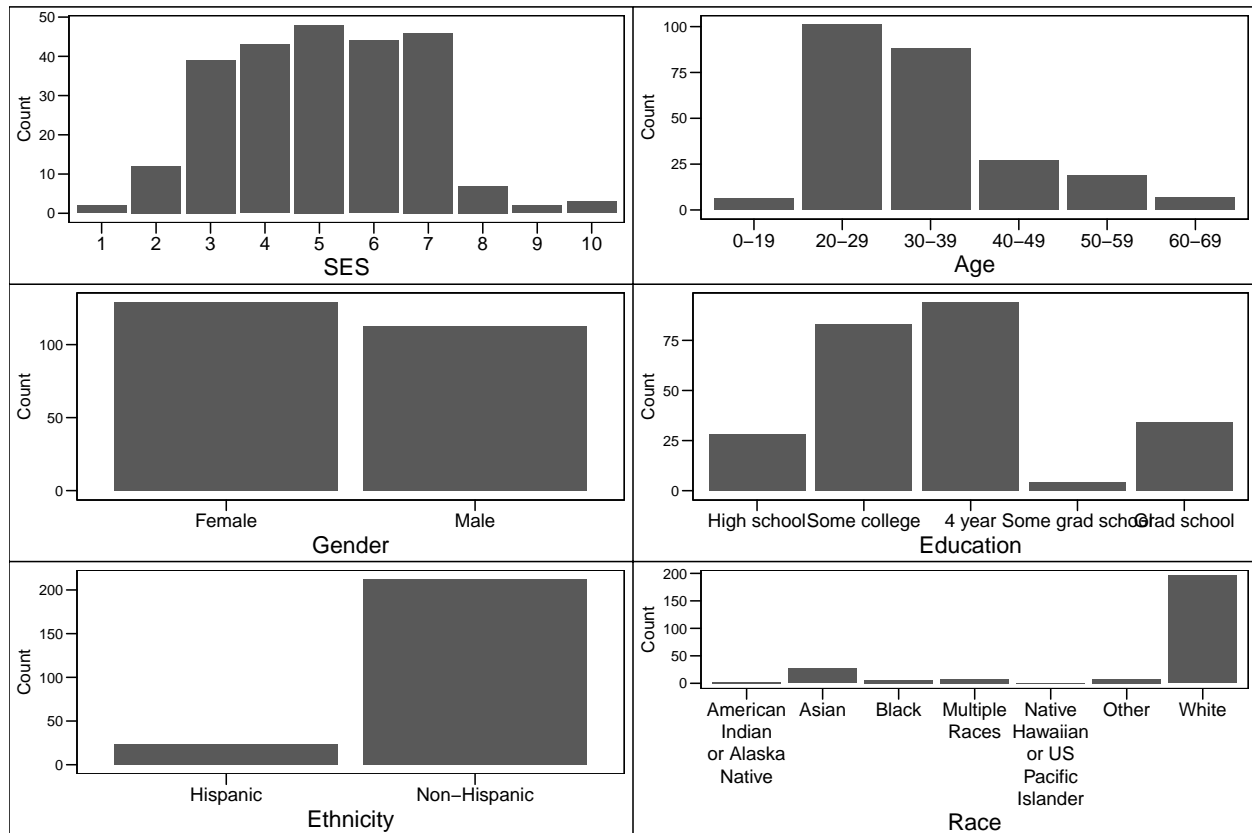
Scale Construction

Figure 1. Demographic information for participants in the final norming sample.

Item generation and dimension reduction

In an initial phase of scale construction, we generated 27 statements that described various attitudes about parenting and child development that we predicted parents might differ on. We selected these items based on a literature review of previous parenting research, including existing measures and theories such as the Knowledge of Infant Development Inventory (KIDI, MacPhee, 2002), Baumrind's parenting framework, and theories of attachment parenting (Jones, Cassidy, & Shaver, 2014). Critically, although the present scale
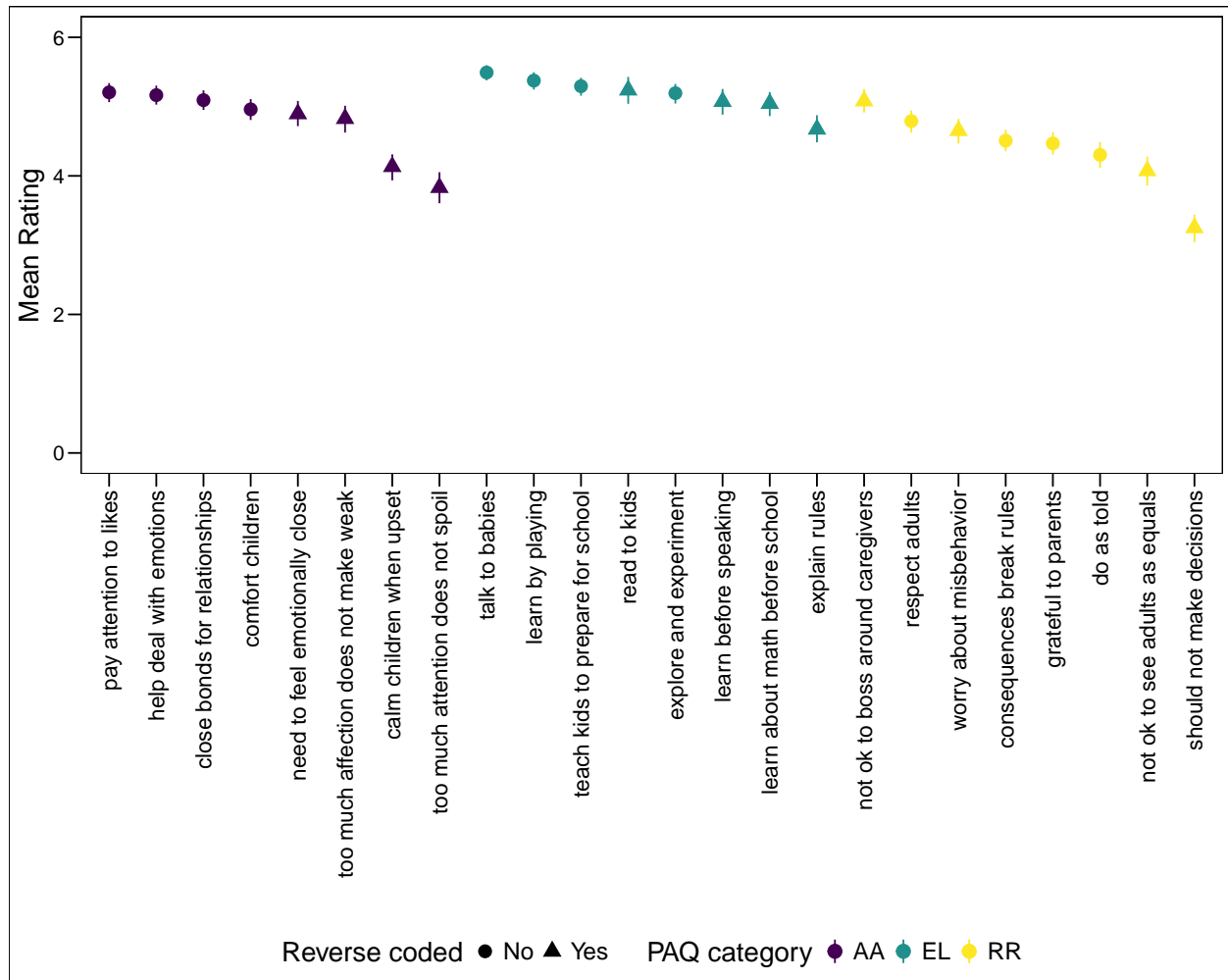
Figure 2. Average ratings for individual PAQ items.

is theoretically related to existing frameworks, the present scale differs from them in that parents are asked about their attitudes, rather than their knowledge or behaviors. Items included in the initial set related to parents' emotional and physical relationships with their children, their beliefs about children's early learning, beliefs about children's autonomy, and other topics.

We administered the initial scale to 250 adults on Amazon's Mechanical Turk (Amazon's Mechanical Turk). Participants used a 7-point Likert scale to report the degree to which they agreed with each statement from 0 (Do not Agree) to 6 (Strongly Agree). We began by conducting exploratory factor analysis (EFA) to assess the dimensionality of the
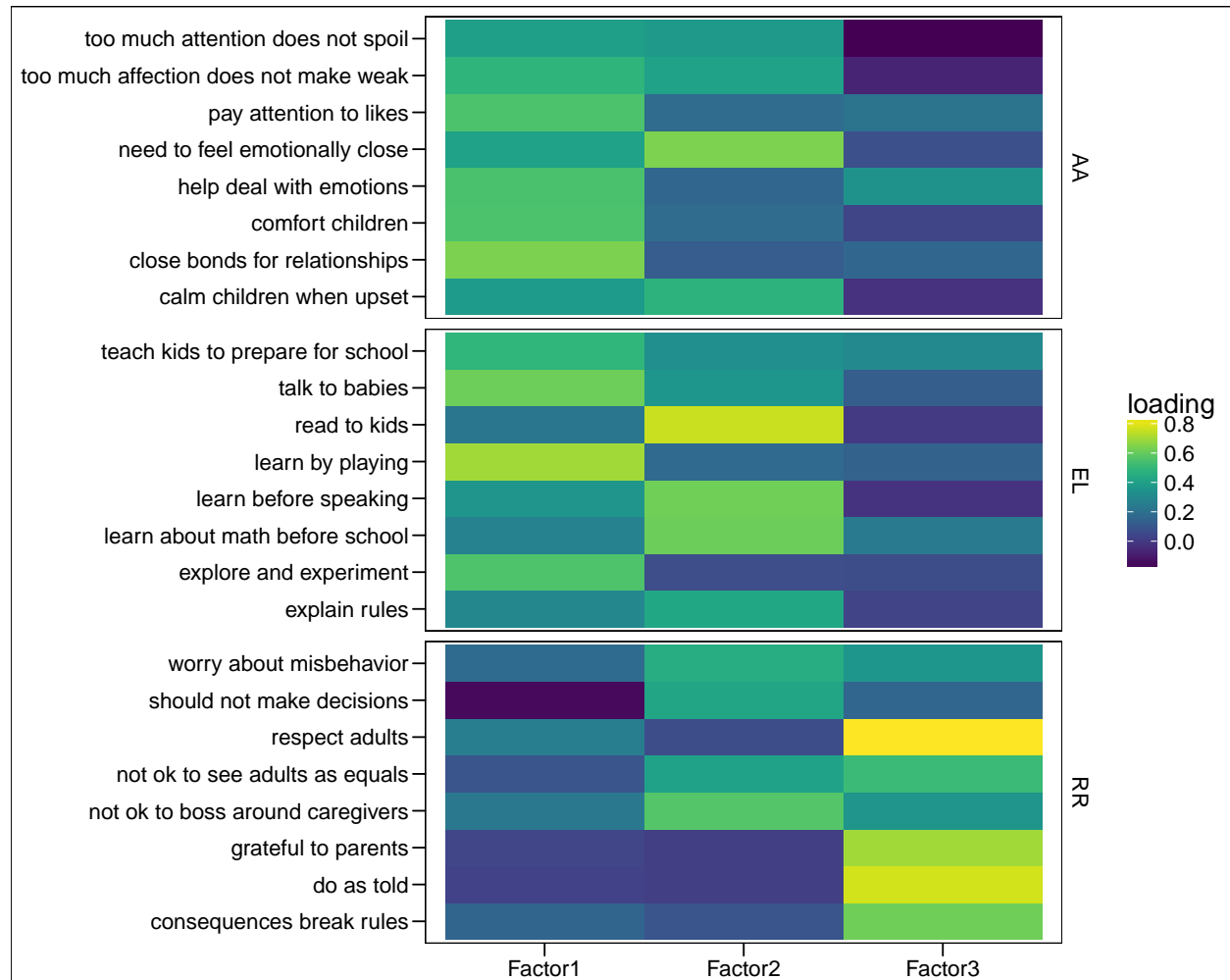
Figure 3. Factor loadings on individual PAQ questions.

scale. Based on the output of a parallel analysis (Horn, 1965), we retained 5 factors in this initial model. We subsequently dropped any items that had factor loadings less than .40 on the relevant factor, as well as any items that had factor loadings greater than .40 on another factor.

We repeated this process a total of 8 times. After several iterations, the parallel analysis began returning 3 factors, so we retained 3 factors in subsequent factor analyses. The first factor appeared to corresponded to a theory about affection and attachment and captured the idea that emotionally close parent-child relationships are important for development. The second factor corresponded to ideas around the importance of fostering

early learning. The third factor corresponded to ideas around rules and respect, including children's autonomy and behavioral control. We titled these factors Affection and Attachment (AA), Early Learning (EL), and Rules and Respect (RR). Once we had identified these categories, we dropped items belonging to each category (based on factor loadings) if analyses revealed that Cronbach's alpha for that category would be increased by dropping the item. We also added new items that were theoretically consistent with the categories that had emerged. Some items were rephrased such that half of the items in each subscale were negatively worded to control for response sets (e.g., a tendency to rate all items highly, Simms, 2008).

Final scale

The final set of items comprising the three subscales is presented in Table **??**. For the final sample, which consisted of 250 participants recruited on Amazon's Mechanical Turk, Chronbach's alpha for the whole scale was 0.90, for the AA subscale was 0.82, for the EL subscale was 0.83, and for the RR subscale was 0.81. In sum, items within subscales are highly correlated, but items across subscales are highly correlated as well, which may reflect response biases to rate all items particularly high or low.

We next examined the loadings of individual items onto the three factors (Figure **??**). Items loaded onto the three factors roughly consistent with our established subscales, although some items from the AA subscale loaded onto both the AA and EL factors, and several items from the EL subscale loaded more strongly onto the AA factor. Given the partial overlap of the EL and AA factors, it is possible that participants' responses on these items were driven to some extent by a more general attitude towards more involved parenting.
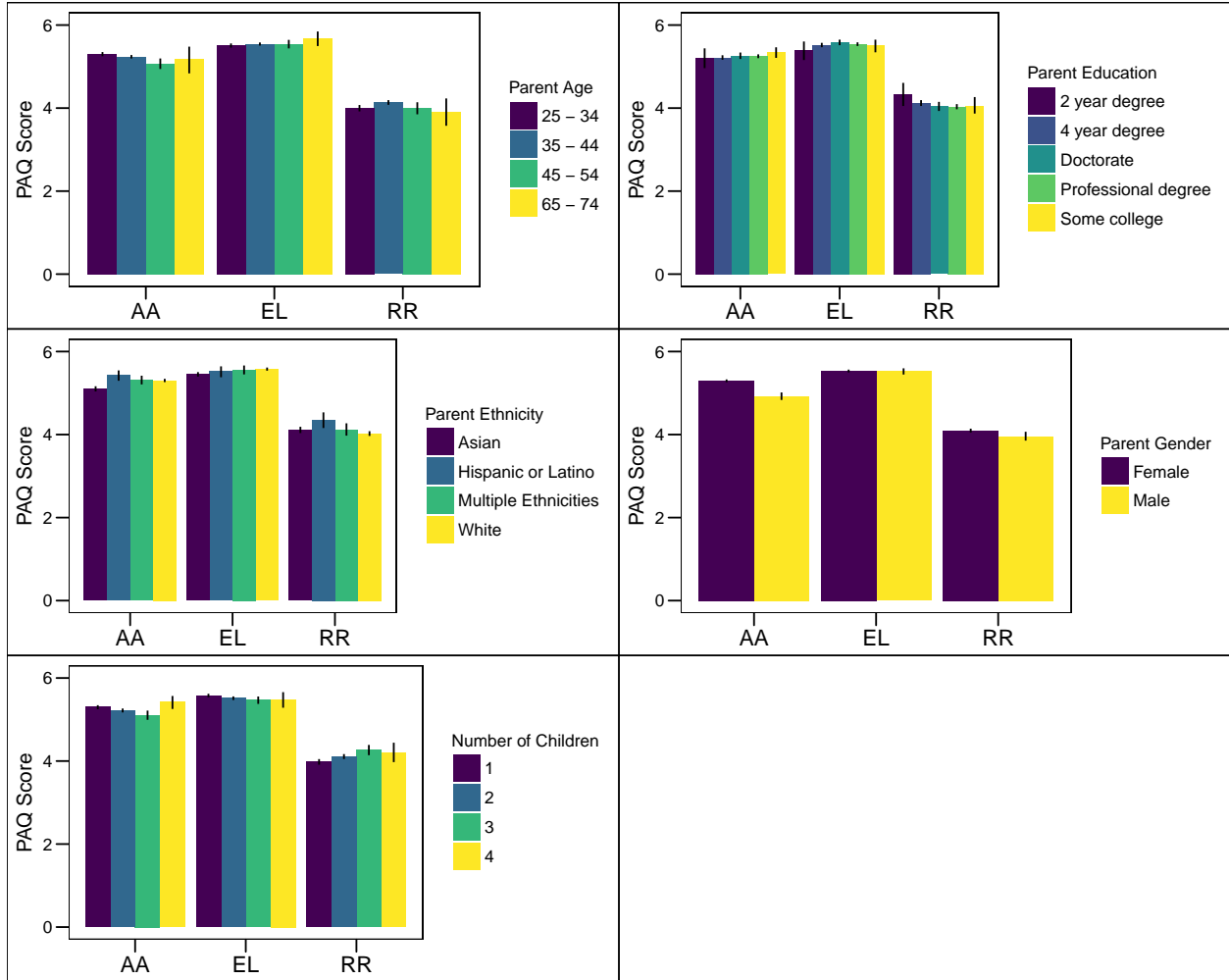
Figure 4. Demographic variability in PAQ scores. Error bars represent +/-95% CI computed by non-parametric bootstrap.

Survey Validation

Study 1: Variability in parenting attitudes based on demographic factors

Table 2

Results of separate bayesian ordinal logistic regressions of demographic factors on agreement with AA, EL, and RR attitudes.

Subscale	Factor	Estimate	Est. Error	Lower 95% CI	Upper 95% CI
AA	Parent Age	-0.00	0.01	-0.01	0.01
	Hispanic or Latino	0.72	0.20	0.34	1.11
	Multiple Ethnicities	0.50	0.16	0.18	0.82
	White	0.31	0.09	0.12	0.49

Approaches to parenting are known to differ across cultures and groups. To better understand whether the parenting attitudes captured by our survey reflect group differences, we examined average scores on the PAQ subscales based on demographic factors.

Methods

Participants and Design

Participants were 680 parents who were members of a local children's museum. Parents received an email from the museum membership list informing them about the opportunity to participate in a study about parenting attitudes. If they were interested, they could provide consent and fill out the survey via a link in the email.

Participants were 84.60% female. On average, parents were highly educated, with 15% of participants having a doctorate, 42.80% having a professional degree, 33.70% having a 4-year-college degree, 3.10% having a 2-year college degree, 4.40% completing some college, 0.60% completing high school, 0.10% not completing high school, and 0.30% not reporting their education background. Participants mostly identified as White (51.60%) or Asian (30%), with 5.10% identifying as Hispanic or Latino, 0.70% identifying as Black or African American, 0.10% identifying as American Indian or Alaska Native, 0.40% identifying as Native Hawaiian or Pacific Islander, 7.90% identifying as Multiple Ethnicities, 2.90% reporting their ethnicity as "Other", and 1% not reporting their ethnicity. Parents were between under 18 years (0.10%), 18-24 years (0.40%), between 25-34 years (0.10%), between 35-44 years (55%), between 45-54 years (7.40%), between 55-64 years (0.90%), and between 65-74 years (1.90%). Parents reported having 1 child (37.40%), 2 children (48.20%), 3 children (10.10%), 4 children (3.10%), 5 children (0.70%), and 0.30% did not report how many children they had.

Parents first completed the PAQ, and then provided information about their gender, level of education, age, ethnicity, and the number of children they have. After completion of the study, parents received a report with results of the study through the membership list.

Results and Discussion

Figure 4 displays the average PAQ scores for each demographic category. To quantify any possible group differences, we fit separate Bayesian mixed-effects ordinal regression models for each subscale (AA, EL, RR) with the following structure, with likert ratings of agreement for each item (1-6) entered as dependent measures: `agreement rating ~ age + education + ethnicity + gender + number of children + (1 | subject) + (1| item)` Groups with fewer than 20 cases were removed from plots and analyses to avoid overfitting. Although parents reported their age in terms of a range (e.g., "25-34"), we treated approximate age as a continuous variable in analyses, using the median of the range parents selected. We also calculated education in years for each of the categories parents reported, so that education could be treated as continuous.

Table 2 displays the results of the regression analyses. We found that stronger agreement with AA attitudes was associated with identifying as Hispanic or Latino ($\beta =$ 0.72, 95% CI = 0.34 - 1.11), White ($\beta =$ 0.31, 95% CI = 0.12 - 0.49), or multiple ethnicities ($\beta =$ 0.50, 95% CI = 0.18 - 0.82) compared to Asian (the comparison level). Having a greater number of children was associated with lower agreement with AA attitudes ($\beta =$ -0.14, 95% CI = -0.24 - -0.03), as was identifying as Male ($\beta =$ -0.70, 95% CI = -0.92 - -0.48). Parent education was not meaningfully associated with AA scores.

We found that stronger agreement with EL scores was associated with identifying as White ($\beta =$ 0.44, 95% CI = 0.25 - 0.62) or multiple ethnicities ($\beta =$ 0.56, 95% CI = 0.22 - 0.90), and having more children was associated with slightly lower agreement with EL scores ($\beta =$ -0.14, 95% CI = -0.24 - -0.03). No other demographic variables were related to EL scores.

Finally, we found that stronger agreement with RR attitudes was associated with having a greater number of children ($\beta =$ 0.15, 95% CI = 0.04 - 0.25), and identifying as White was associated with lower agreement with RR attitudes ($\beta =$ -0.20, 95% CI = -0.38 - -0.01).

These results suggest that parenting attitudes vary based on some demographic factors. The strongest effect we observed was of gender on AA attitudes, with females reporting stronger agreement with these items. This pattern could reflect a cultural expectation for females to more readily display affection, and/or theories of attachment parenting which often focus on physical closeness between mother and child (**???**). We also found that Asian parents reported lower AA agreement compared to other racial groups, which is consistent with previous research showing that (**???** about parenting differences in asian groups?). We also found that identifying as White or Multiple Ethnicities was associated with greater agreement with EL attitudes. This could reflect a contemporary Western focus on exploration and play as important learning opportunities in childhood, which is captured by the EL subscale (**???** for this??).

It should be noted that the population we sampled was highly educated and predominantly female. We also had limited ability to estimate attitudes of racial or ethnic identifications other than White, Asian, Hispanic or Latino, or Multiple Ethnicities, because they were under-sampled. Further investigations with a broader range of education and racial and ethnic backgrounds and a greater proportion of fathers would provide a clearer picture of demographic variability in attitudes.

Study 2: Relation of attitudes to parenting behaviors

Another way of assessing the ecological validity of the PAQ is to ask whether the parenting attitudes it measures are related to actual parenting behaviors. For example, do parents who strongly agree with items on the Early Learning subscale read to their children more often? Do parents who strongly endorse items on the Rules and Respect subscale give more time-outs? TO assess this, we had parents complete the PAQ and then rate the frequency with which they engaged in a number of parenting behaviors.
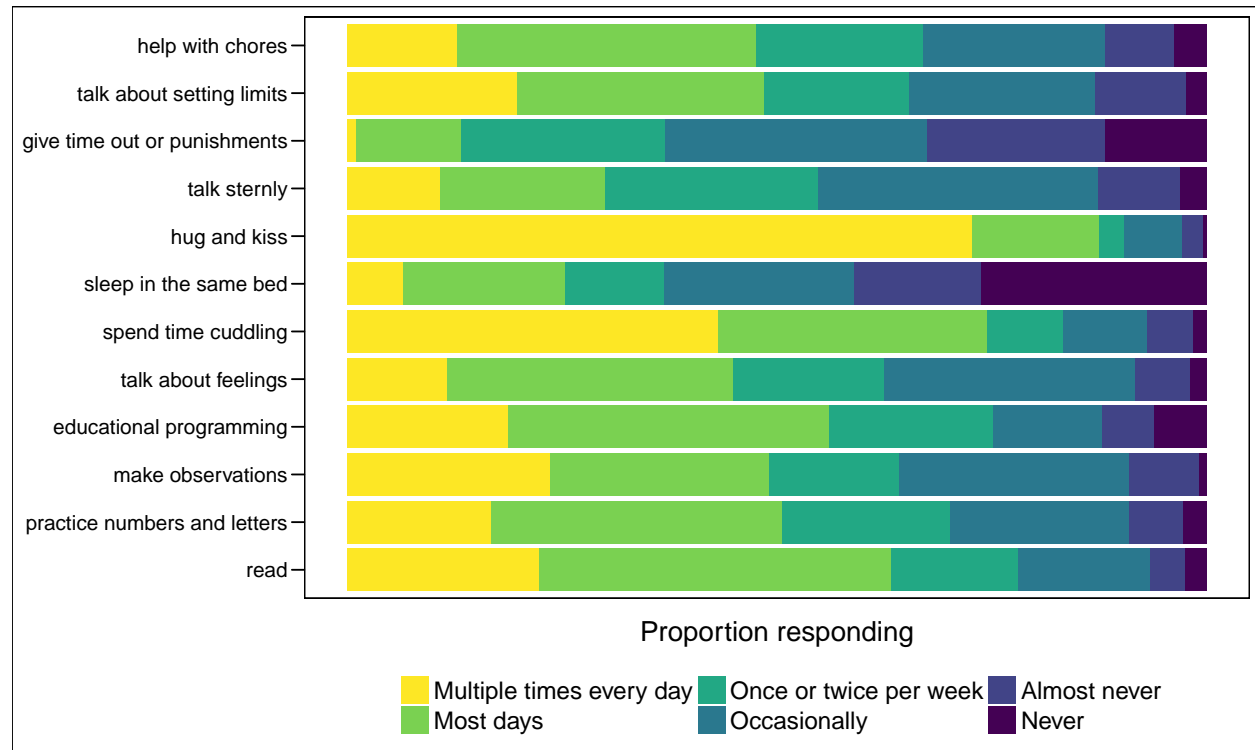
Figure 5. Frequencies of parenting activities reported by parents.

Methods

Participants and Design

Participants were 250 parents recruited through Amazon's Mechanical Turk. Parents completed the PAQ and then responded about how often they engaged in 12 different parenting behaviors, focusing on the prior month. Of the 12 behaviors, four corresponded theoretically to each PAQ category (Table 4). Parents chose between the following frequency options: "Multiple times per day", "Most days", "Once or twice per week," "Occasionally," "Almost never," "Never," and "My child is too young for this." Parents who reported that they did not have children under the age of 5 were excluded from analyses, as were any items for which parents responded "My child is too young for this."
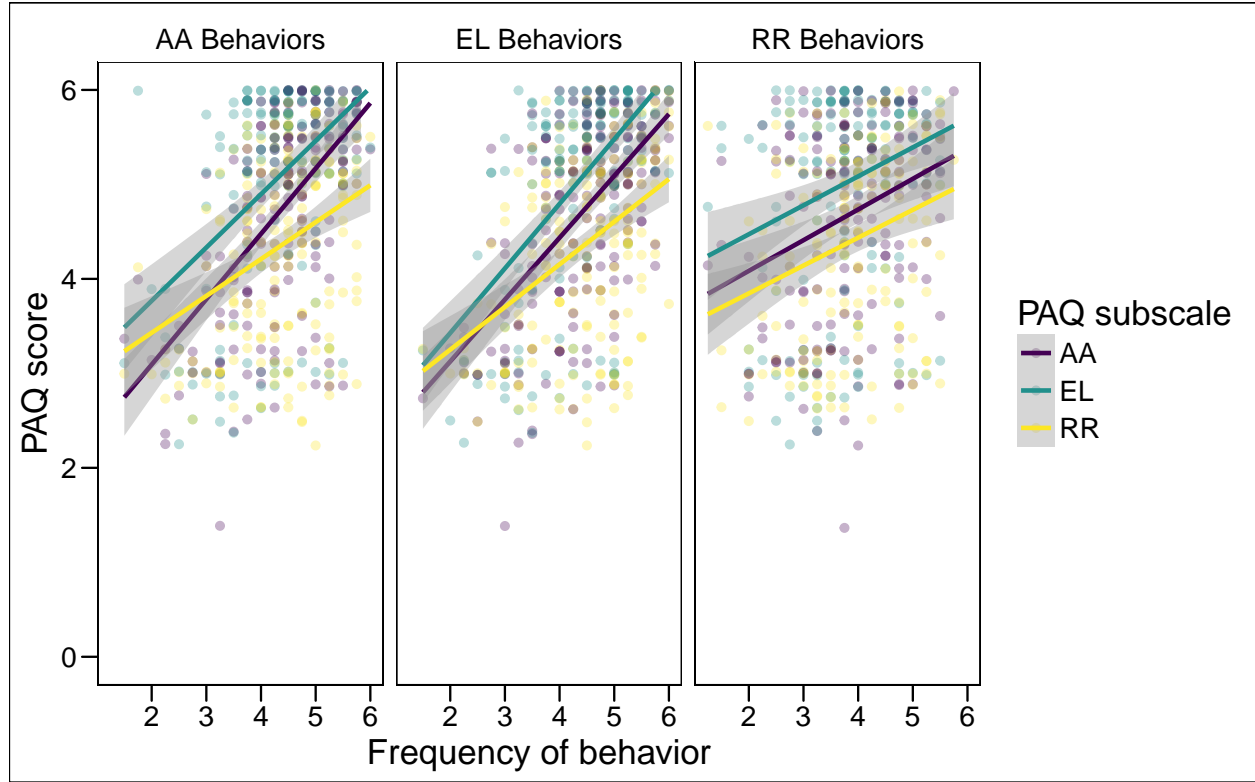
Figure 6. Relations between PAQ scores (Affection and Attachment, Early Learning, and Rules and Respect) and the frequency of parenting behaviors divided into the same categories.

Results and Discussion

The distribution of frequencies that parents reported is displayed in Figure 5. To assess whether parenting behaviors are associated with parenting attitudes, we calculated participants' average PAQ subscale scores and fit separate bayesian ordinal logistic mixed-effects regressions for the three cateogories of behaviors with the following structure: `behavior frequency ~ AA PAQ score + EL PAQ score + RR PAQ score + child age + (1 | subject) + (1| item)` (Table 3). The relation between PAQ scores and behavior frequencies are presented in Figure 6.

We found that the frequency of AA behaviors was positively associated with AA attitudes ($\beta = 0.81$, 95% CI = 0.53 - 1.12), but not RR or EL attitudes or child age. Frequency of EL behaviors was positively associated with stronger agreement with both AA

($\beta = 0.37$, 95% CI = 0.02 - 0.71) and EL attitudes ($\beta = 0.52$, 95% CI = 0.18 - 0.88). The frequency of RR behaviors was positively associated with stronger RR attitudes ($\beta = 0.34$, 95% CI = 0.05 - 0.63), and to a lesser extent, child age ($\beta = 0.03$, 95% CI = 0.01 - 0.05).

These results suggest that parenting attitudes as assessed by the PAQ have a meaningful relation to the actual behaviors parents engage in with their children. This suggests that the current scale taps firmly held beliefs that drive parents' decisions and behavior. It also suggests that intervening on these beliefs may be an effective way of promoting behavior change in parents, for example, to promote opportunities for early learning. However, it is important to consider that the present data are correlational and based on self-report. For example, it is possible that participants' self-reported behaviors capture their intentions rather than their actual behaviors, which would likely be highly correlated with their self-reported attitudes. Future work utilizing an intervention approach, and/or a diary method of self-report, would help distinguish these possibilities.

Study 3: Memory for new information about parenting and child development

Parents' attitudes about parenting and child development may be an important consideration for crafting interventions on parenting behaviors or beliefs. Efforts to intervene on parenting practices are common, for example, public service announcements telling parents to read to their children; courses aimed at helping fathers engage with their children; messages aimed at encouraging parents and teachers to give children opportunities for free play. There is evidence that existing lay theories can interact in surprising ways with this type of messaging in other domains. Here we asked whether parents' attitudes about parenting and child development would predict how they understand and remember new information about child development versus an unrelated topic.
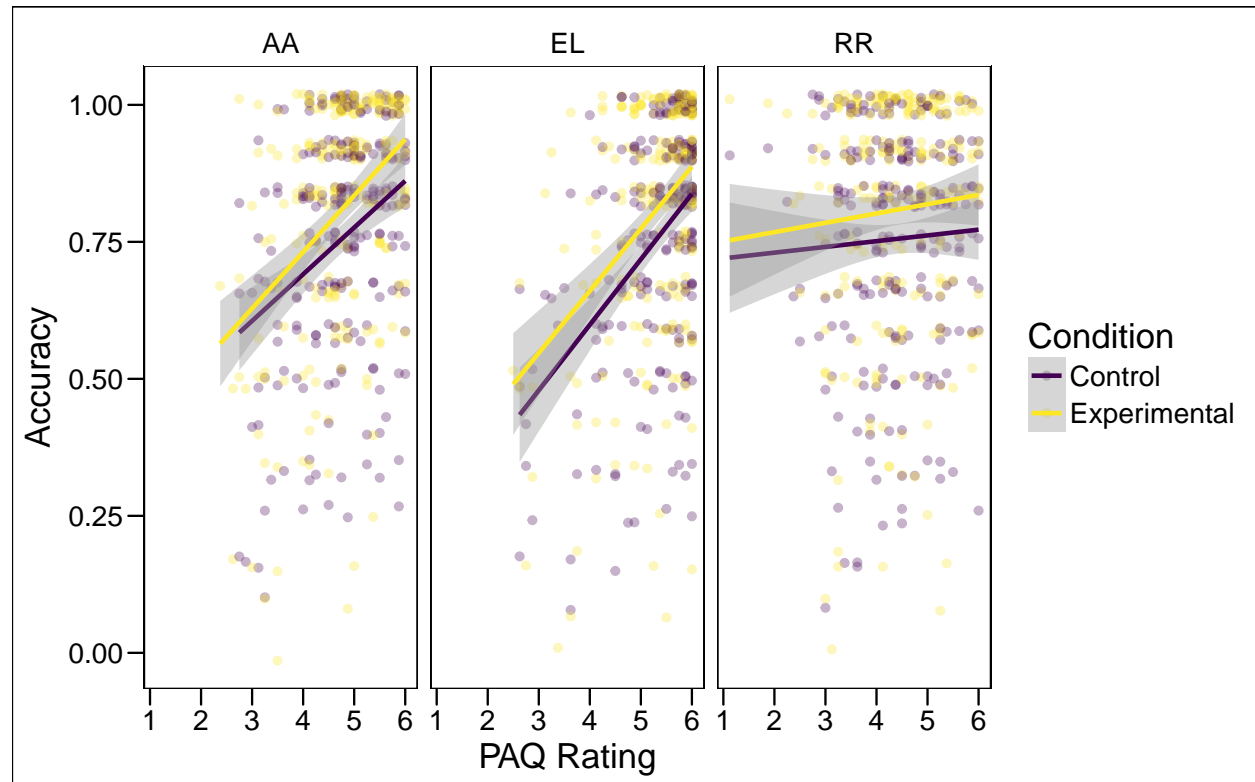
Figure 7. Relations between PAQ scores (Affection and Attachment, Early Learning, and Rules and Respect) and the uptake of information in experimental (child development-related) and control articles.

Methods

Participants and Design

Participants were 250 adults (parents and non-parents) recruited on Amazon's Mechanical Turk. Participants first filled out the PAQ, and then read four popular press articles, two of which related to early learning and cognitive development (one about children's learning from spontaneous play; **???**, and one about infants learning from events that defy their expectations about physical properties of the world (**???**)) and two of which related to other science topics (one about irridescence in plants; **???**, and one about the "island rule," which attempts to explain why species on islands tend to be smaller than on the mainland, **???**). The articles were edited for length, and the order in which the articles

were presented was randomized.

Next, participants answered six four-alternative forced-choice questions testing their memory and understanding of each article (24 total questions). For each article, half of the questions focused on specific details from the article, and half focused on generalized concepts introduced in the article to test whether participants had comprehended the overall message of the article. For example, a question testing specific details from one of the EL articles was: "In this article, children saw unexpected events including:" with the following options: "A toy car rolling through a solid wall" (the correct answer), "A toy falling off the table", "A toy animal speaking out loud", and "A balloon flying away". A question testing generalization of the concepts in the same article was: "Based on the results of the study described in this article, researchers can conclude that:" with the following options: "Babies have trouble processing surprising events and learn by paying attention to familiar, predictable events", "Babies learn by paying attention to surprising events" (the correct answer),"Babies quickly learn new rules about the physical world (e.g., cars can go through walls) if they see it happen once", and "Babies do not know enough about the physical world to be surprised by a toy going through a wall". We were specifically interested in whether participants who agreed more strongly with EL attitudes would better understand and remember the information in the EL articles, which we predicted may have been consistent with their existing views of development, or consistent with their interests, and thus easier to learn.

Results

The average accuracy for control questions was $0.76(CI = 0.73 - 0.78)$ and the average accuracy for experimenter questions was $0.81(CI = 0.73 - 0.83)$. There was no significant difference in accuracy between conditions, $t = -4.83$, $p = 0.00$.

Participants' accuracy in relation to their average AA, EL and RR scores is displayed in Figure 7. To quantify whether participants who more strongly agreed with EL attitudes were at an advantage for understanding and remembering the child development articles they

read, we fit a bayesian logistic mixed-effects regression with the following structure: `accuracy ~ AA PAQ score * article type + EL PAQ score * article type + RR PAQ score * article type + (article type | subject) + (1| item)`. We excluded 7.70% of responses from analyses because participants spent fewer than 15 seconds reading the article, our pre-determined minimum reading time.

We found that participants who agreed more strongly with EL attitudes were more likely to answer memory questions correctly overall ($\beta = 0.82$, 95% CI = 0.52 - 1.14), but there was no interaction between EL scores and article type, meaning that there was no advantage for people with higher EL scores for understanding child development content in particular. However, unexpectedly, there was an interaction between AA attitudes and article type ($\beta = 0.42$, 95% CI = 0.11 - 0.73), such that people with stronger AA attitudes performed better on questions about child development articles compared to control articles. Rules and Respect attitudes did not predict memory for the articles.

In sum, our results suggest that people who believe more strongly in the importance of early learning (i.e., those with higher EL PAQ scores) are more likely to understand and recall details from science articles, but they do not have a specific advantage for science articles related to cognitive development during infancy. Contrary to our predictions, we did find that people with higher AA scores had a specific advantage for remembering the EL articles compared to control articles. Although the present data cannot speak to why this might be, one possibility is that people with higher AA scores have a stronger orientation towards content about early childhood (compared to the unrelated content in the control article) in general. These results could also reflect the fact that EL and AA attitudes may overlap somewhat, as suggested by their respective factor loadings, at least in the population we sampled for these analyses.

Discussion

In the present work, we established a new scale to measure people's attitudes about parenting and child development in three categories: Rules and Respect, Affection and Attachment, and Early Learning. These subscales are meant to capture meaningful differences in how people view child development and the relative importance of different parenting behaviors. We subjected our new scale to psychometric evaluation, and found acceptably high correlations among subscale items, as well as the predicted factor structure across subscales. In addition, we found meaningful differences in attitudes across demographic groups and we observed the expected relations between parenting attitudes and behaviors. We also found that PAQ subscale scores predicted understanding and memory for new information in science articles, though not in the predicted patterns, as people with higher AA scores had an advantage for remembering the content of EL articles, but not people with higher EL scores.

In sum, this work provides initial evidence that meaningful differences in adults' attitudes about child development and parenting can be assessed by our new scale.

Although the present studies provide initial evidence for the reliability and validity of our parenting measure among the population we sampled, which was predominantly White and highly educated, further evidence across a broader range of participants would provide additional support for the scale. In addition, future work should target predictive validity by determining whether subscale scores differentially predict parents observable behaviors with their children, such as the quality of conversations they engage their child in.

Implicit theories are a powerful driver of human behavior. Sometimes, the interaction between interventions and their subjects' underlying beliefs can produce powerful, non-linear results (**???**). Thus, given both the variability in attitudes towards parenting across cultures and the importance of improving parenting outcomes, it behooves us to understand implicit theories of parenting. The current work takes a first step in this direction.

References

Bransford, J. D., & Johnson, M. K. (1972). Contextual prerequisites for understanding: Some investigations of comprehension and recall. *Journal of Verbal Learning and Verbal Behavior*, *11*(6), 717–726.

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, *7*(3), 309–319.

Furr, M. (2011). *Scale Construction and Psychometrics for Social and Personality Psychology*. SAGE Publications Ltd.

Hoff, E. (2003). The Specificity of Environmental Influence: Socioeconomic Status Affects Early Vocabulary Development Via Maternal Speech. *Child Development*, *74*(5), 1368–1378.

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, *30*(2), 179–185.

Huttenlocher, J., Vasilyeva, M., Cymerman, E., & Levine, S. (2002). Language input and child syntax. *Cognitive Psychology*, *45*(3), 337–374.

Jones, J. D., Cassidy, J., & Shaver, P. R. (2014). Parents Self-Reported Attachment Styles A Review of Links with Parenting Behaviors, Emotions, and Cognitions. *Personality and Social Psychology Review*, *19*(1), 1088868314541858–76.

LeVine, R. A. (2004). *Challenging Expert Knowledge: Findings from an African Study of Infant Care and Development*. Praeger Publishers/Greenwood Publishing Group.

MacPhee, D. (2002). *Knowledge of infant development inventory: Manual*. Colorado: Colorado State University.

Richman, A. L., Miller, P. M., & LeVine, R. A. (1992). Cultural and educational variations in maternal responsiveness. *Developmental Psychology*, *28*(4), 614–621.

Rowe, M. L. (2008). Child-directed speech: relation to socioeconomic status, knowledge of child development and child vocabulary skill. *Journal of Child Language*, *35*(01),

185–205.

Simms, L. J. (2008). Classical and Modern Methods of Psychological Scale Construction. *Social and Personality Psychology Compass*, *2*(1), 414–433.

Table 1

Parenting Attitudes Scale items.

Category	Item
AA	Children should be comforted when they are scared or unhappy.
	Its important for parents to help children learn to deal with their emotions.
	Parents should pay attention to what their child likes and dislikes.
	A child who has close bonds with his or her parents will have better relationships later on in life.
	Children who receive too much attention from their parents become spoiled.*
	Too much affection, such as hugging and kissing, can make a child weak.*
	Children and parents do not need to feel emotionally close as long as children are kept safe.*
	Parents should not try to calm a child who is upset, it is better to let children calm themselves.*
EL	It is good to let children explore and experiment.
	Parents can help babies learn language by talking to them.
	Parents can prepare young children to succeed in school by teaching them things, such as shapes and numbers.
	Babies can learn a lot just by playing.
	It is not helpful to explain the reasons for rules to young children because they wont understand.*
	Children dont need to learn about numbers and math until they go to school.*
	Reading books to children is not helpful if they have not yet learned to speak.*
	Babies cant learn about the world until they learn to speak.*
RR	It is very important that children learn to respect adults, such as parents and teachers.
	It is very important for young children to do as they are told, for example, waiting when they are told to wait.
	Children should be grateful to their parents.
	It is very important that there are consequences when a child breaks a rule, big or small.
	It is okay if young children boss around their caregivers.*
	It is okay if children see adults as equals rather than viewing them with respect.*
	Young children should be allowed to make their own decisions, like what to play with and when to eat.*
	Parents do not need to worry if their child misbehaves a lot.*

Note:

*Indicates reverse coded items.

Table 3

Results of separate bayesian ordinal logistic regressions of PAQ scores and child age on frequency of parenting behaviors in Affection and Attachment (AA), Early Learning (EL), and Rules and Respect (RR) categories.

Behavior Category	Factor	Estimate	Est. Error	Lower 95% CI	Upper 95% CI
AA	AA PAQ score	0.81	0.15	0.53	1.12
	RR PAQ score	-0.02	0.11	-0.24	0.19
	EL PAQ score	-0.01	0.14	-0.30	0.26
	Child Age	0.01	0.01	-0.00	0.02
EL	AA PAQ score	0.37	0.18	0.02	0.71
	RR PAQ score	0.20	0.13	-0.06	0.45
	EL PAQ score	0.52	0.18	0.18	0.88
	Child Age	0.01	0.01	-0.00	0.03
RR	AA PAQ score	0.10	0.21	-0.30	0.50
	RR PAQ score	0.34	0.15	0.05	0.63
	EL PAQ score	0.02	0.21	-0.40	0.42
	Child Age	0.03	0.01	0.01	0.05

Table 4

Frequencies of parenting activities reported by parents.

Category	In the last month, how often did...
AA	you and your child talk about feelings (e.g., when he/she was sad/angry)?
	you and your child spend time cuddling?
	your child sleep in the same bed as you?
	you hug or kiss your child?
EL	you read to your child?
	you practice numbers or letters with your child?
	you share facts or observations about the world when you were doing other tasks (e.g., did you know butter comes from cows? while shopping at the grocery store)?
	your child watch educational programming (e.g., shows like Sesame Street) or play with educational apps (e.g., apps designed to teach numbers, colors, shapes, etc.) on a tablet or mobile device?
RR	you talk sternly to your child when he/she did something you dont want?
	you give your child time out or other punishments for acting out?
	you talk about setting limits with your child (e.g., only 10 minutes of screen time or no hitting)?
	your child help or try to help with chores or tasks (including cleaning up his/her toys)?

Table 5

Results of a bayesian logistic regression of PAQ scores and article topic (EL vs. control) on memory for information in articles.

Factor	Estimate	Est. Error	Lower 95% CI	Upper 95% CI
EL Articles	-0.21	0.75	-1.68	1.29
AA PAQ score	0.05	0.15	-0.25	0.35
RR PAQ score	-0.21	0.11	-0.42	0.01
EL PAQ score	0.82	0.16	0.52	1.14
AA PAQ score * EL Articles	0.42	0.16	0.11	0.73
RR PAQ score * EL Articles	0.02	0.11	-0.19	0.23
EL PAQ score * EL Articles	-0.27	0.16	-0.58	0.05