Measuring Lay Theories of Parenting and Child Development

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Abstract

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Introduction

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

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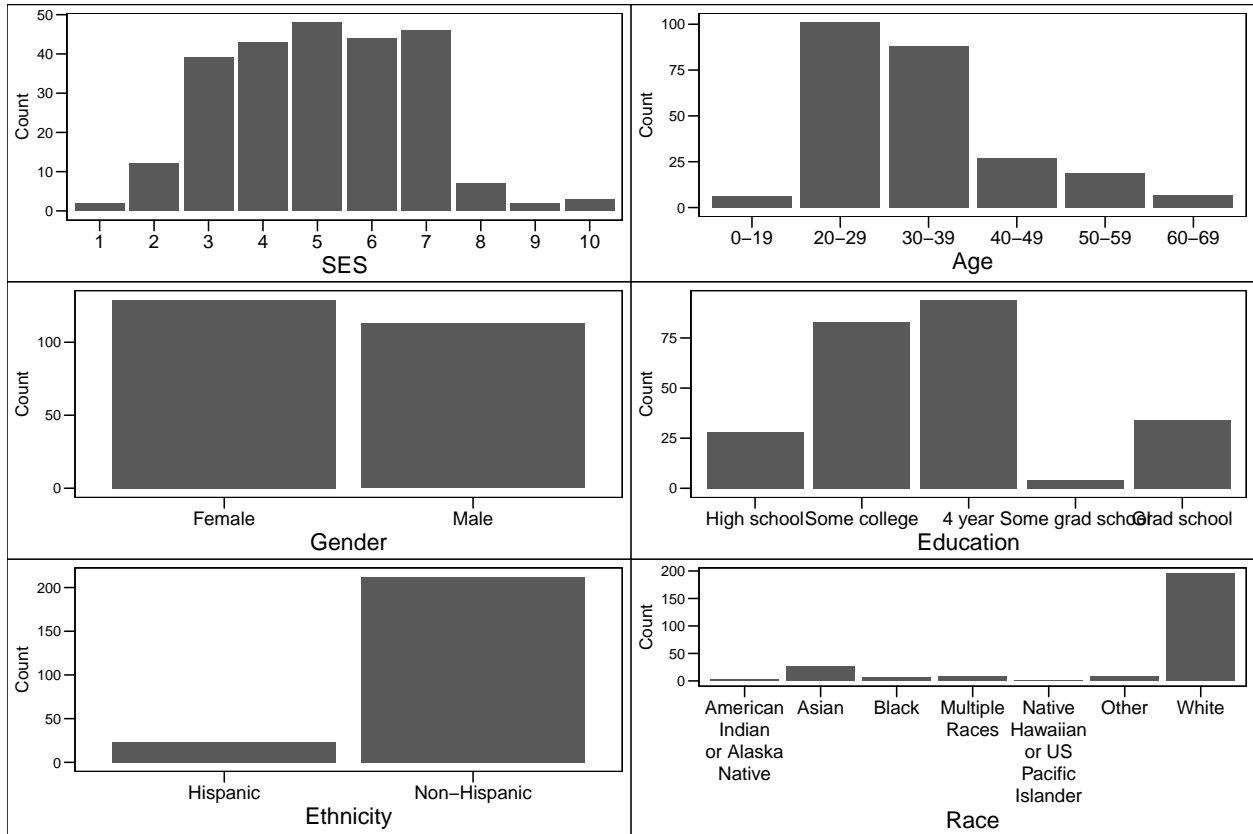
Figure 1. Demographic information for participants in the final norming sample.

We administered the initial scale to 250 adults on Amazon's Mechanical Turk (Mturk). 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 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
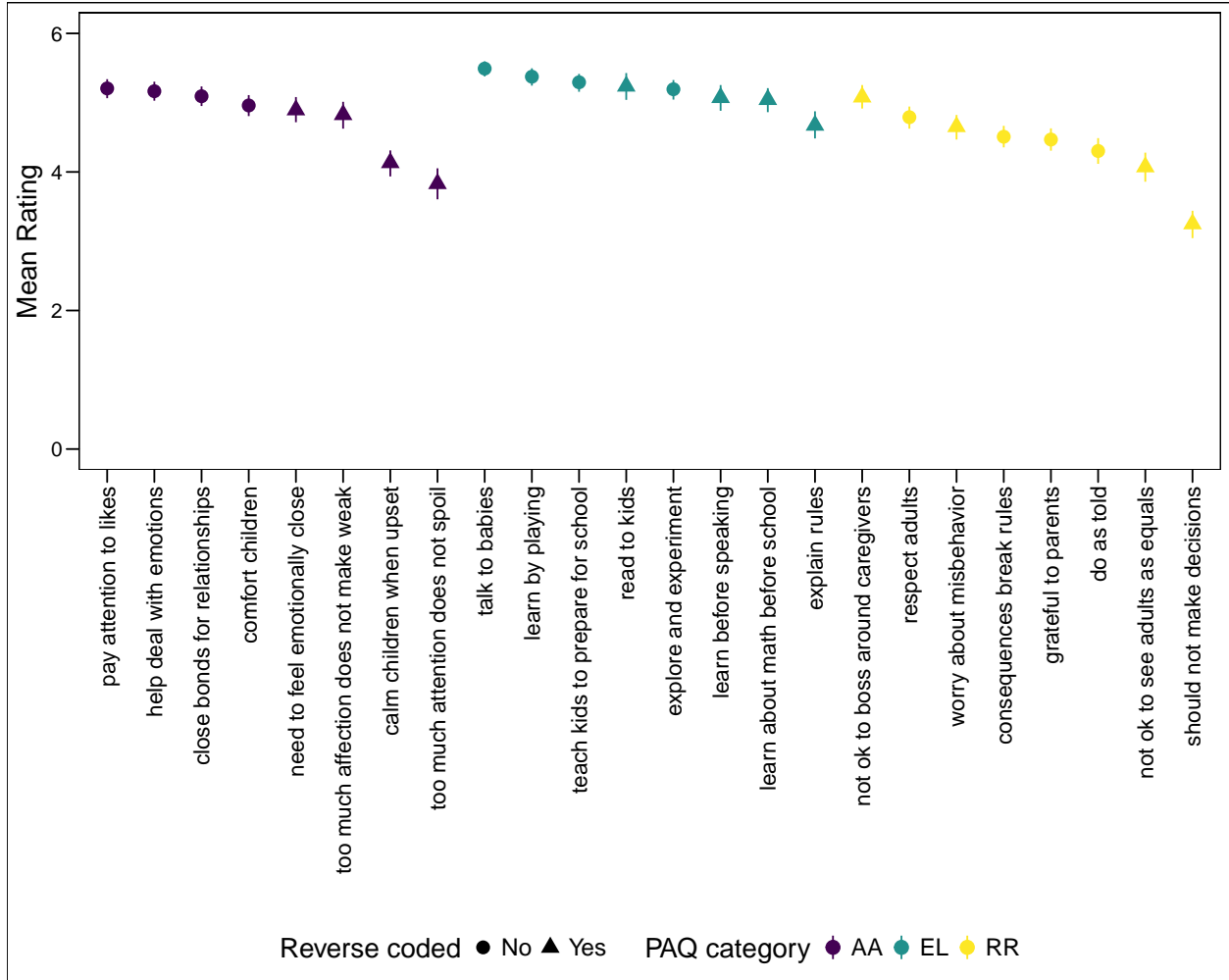
Figure 2. Average ratings for individual PAQ items.

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).
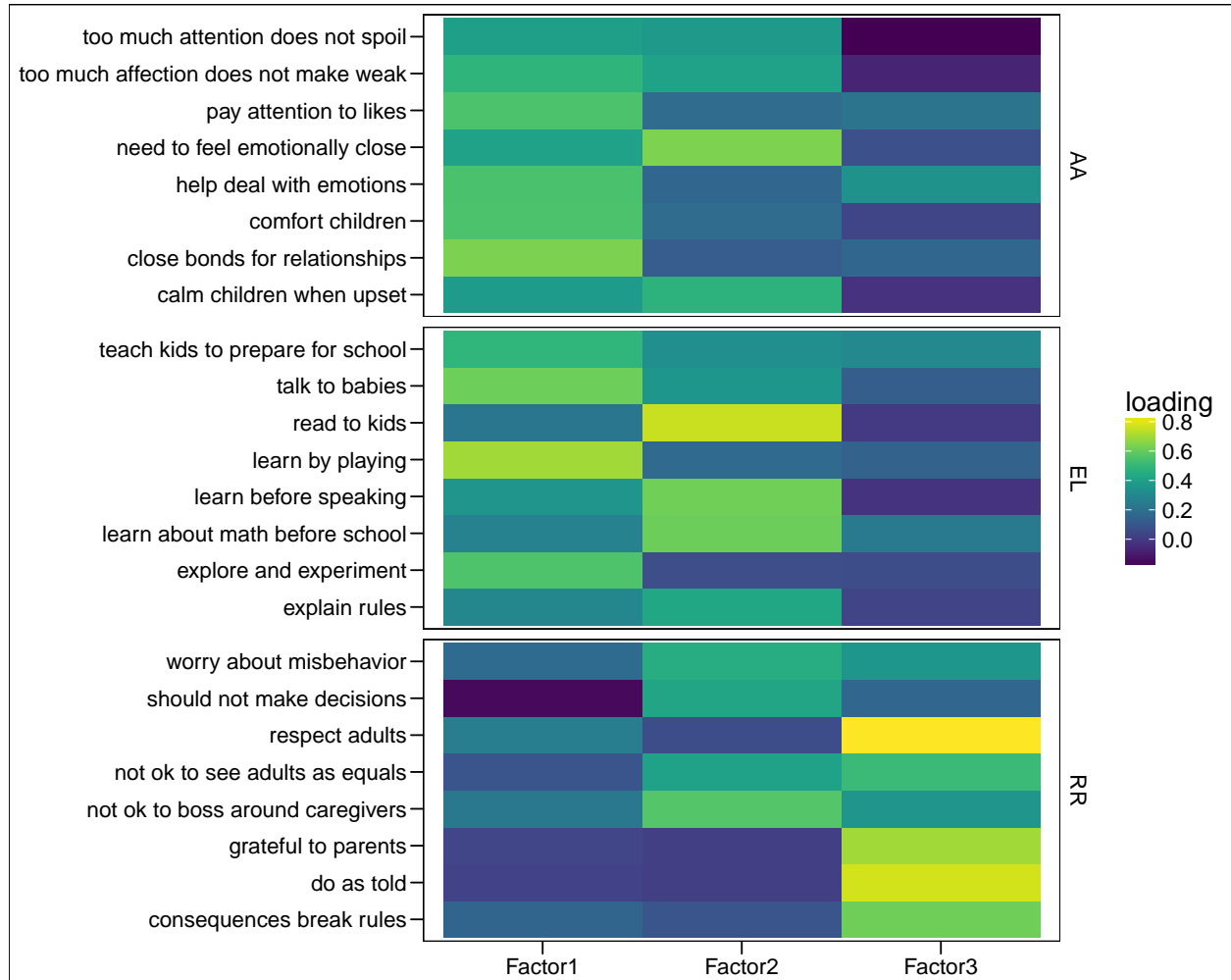
Figure 3. Factor loadings on individual PAQ questions.

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 Mturk, 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.

Survey Validation

Study 1: Variability in parenting attitudes based on demographic factors
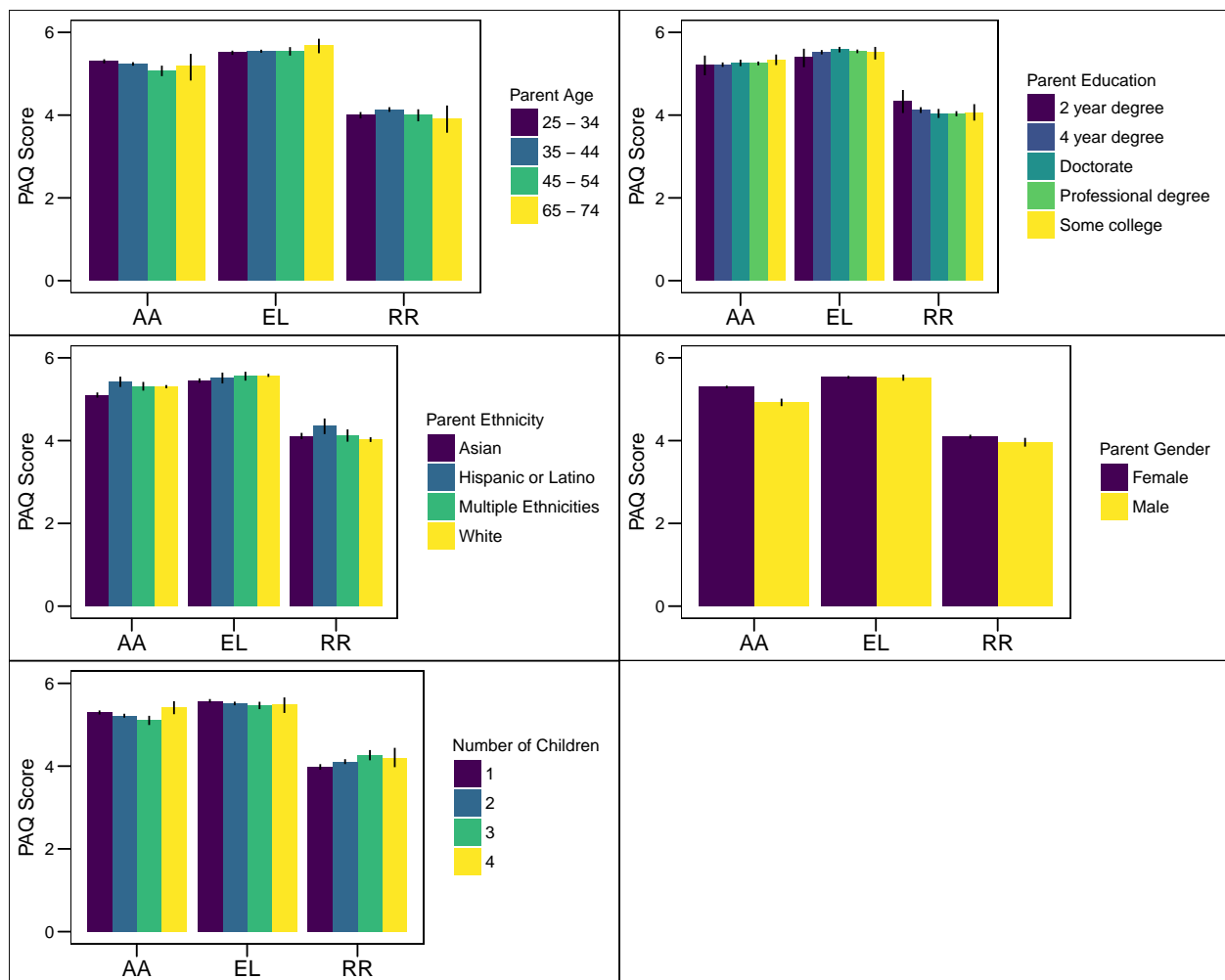

Figure 4. Demographic variability in PAQ scores. Error bars represent +/-95% CI computed by non-parametric bootstrap.

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
	Parent Education	0.02	0.02	-0.01	0.05
	Number of children	-0.14	0.05	-0.24	-0.03
	Male	-0.70	0.11	-0.92	-0.48
EL	Parent Age	0.01	0.01	-0.00	0.02
	Hispanic or Latino	0.26	0.19	-0.12	0.64
	Multiple Ethnicities	0.56	0.17	0.22	0.90
	White	0.44	0.09	0.25	0.62
	Parent Education	0.02	0.02	-0.01	0.05
	Number of children	-0.14	0.05	-0.24	-0.03
	Male	-0.18	0.11	-0.41	0.04
RR	Parent Age	-0.00	0.01	-0.01	0.01
	Hispanic or Latino	0.27	0.20	-0.11	0.67
	Multiple Ethnicities	-0.02	0.17	-0.34	0.31
	White	-0.20	0.10	-0.38	-0.01
	Parent Education	-0.02	0.02	-0.05	0.01
	Number of children	0.15	0.06	0.04	0.25
	Male	-0.17	0.12	-0.39	0.06

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. We administered the PAQ to 680 parents who were members of a local children's museum and subsequently asked them to provide information about their gender, level of education, age, ethnicity, and the number of children they have. 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 displayed as categorical for visual simplicity in Figure 4, parent age and education in years were entered as continuous variables in the regression models.

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).

Study 2: Relation of attitudes to parenting behaviors
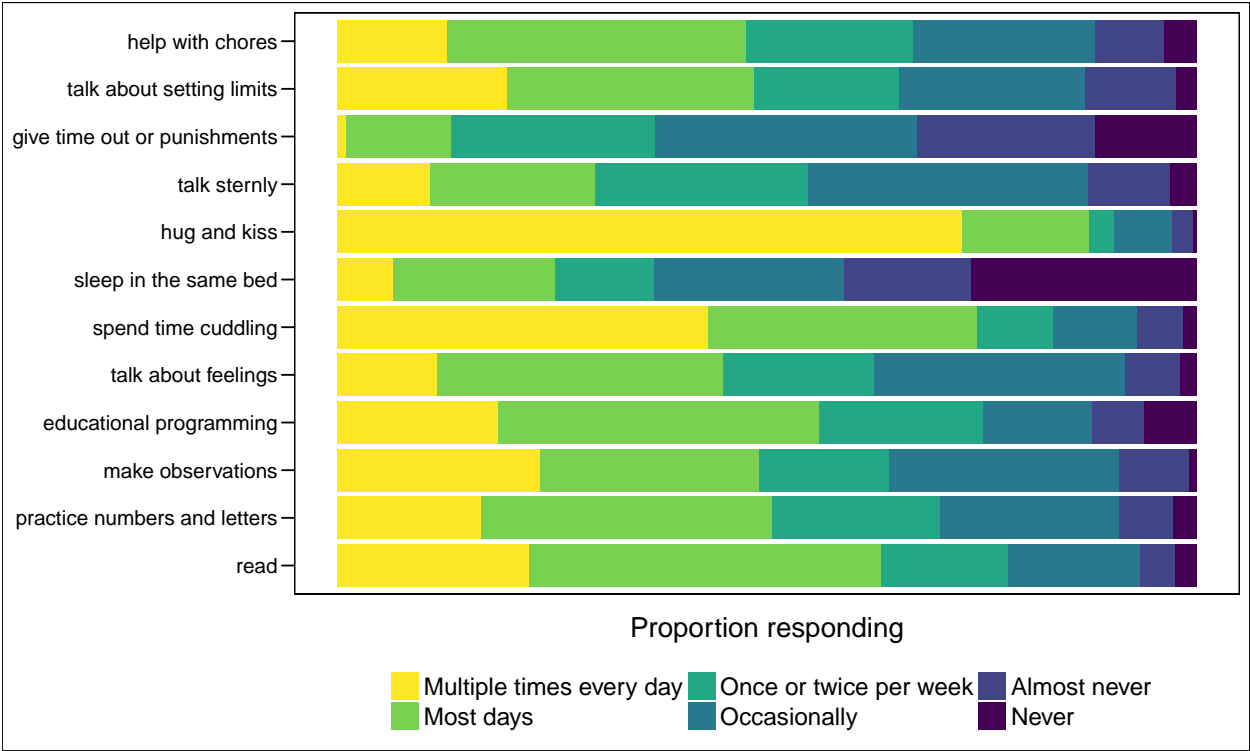

Figure 5. Frequencies of parenting activities reported by parents.

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 asked a sample of 250 parents on Mturk to complete the PAQ and then rate the frequency with which they engaged in a number of parenting behaviors, focusing on the prior month (Table 4). We elicited responses about 12 different behaviors, with four corresponding to each PAQ category. Parents chose between the
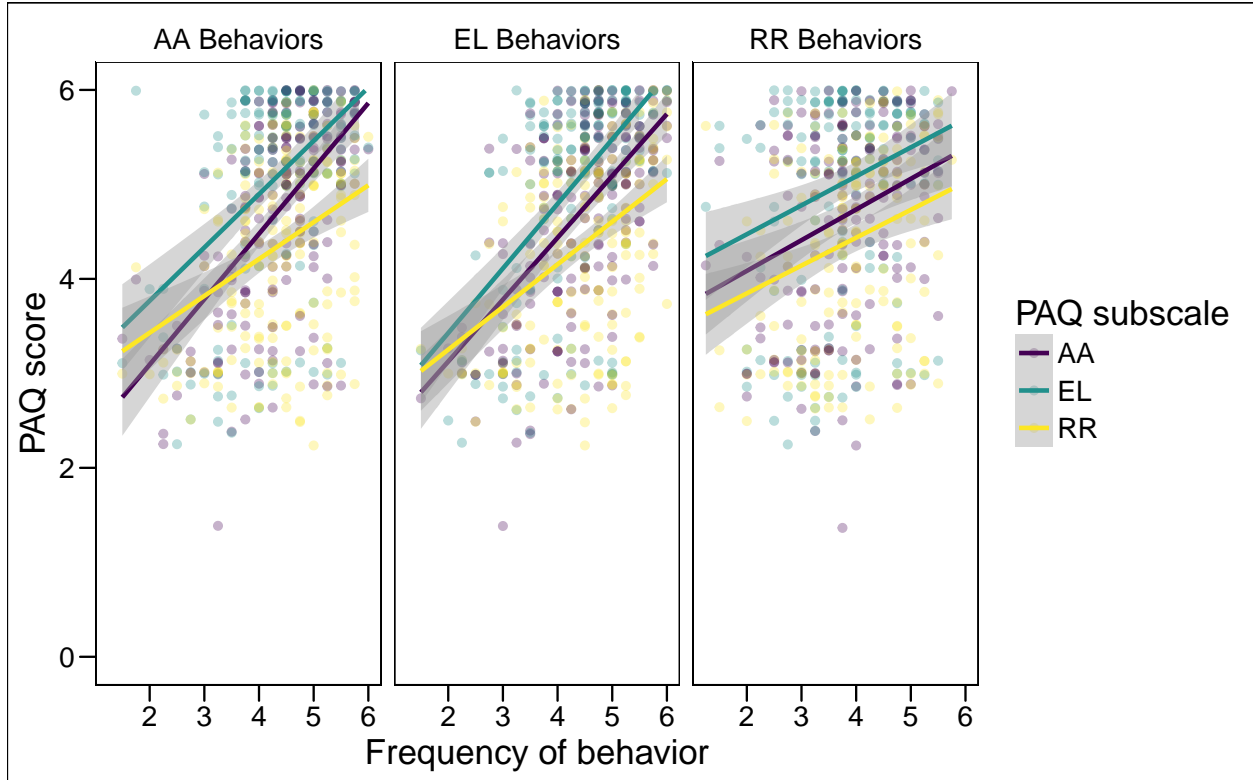
Figure 6. Relations between PAQ scores (Affection and Attachment, Early Learning, and Rules and Respect) and the frequency of parenting behaviors divided into the same categories.

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 did not have children under the age of 5 were excluded from analyses, as were any responses of "My child is too young for this."

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 (β = 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 (β = 0.37, 95% CI = 0.02 - 0.71) and EL attitudes (β = 0.52, 95% CI = 0.18 - 0.88). The frequency of RR behaviors was positively associated with stronger RR attitudes (β = 0.34, 95% CI = 0.05 - 0.63), and to a lesser extent, child age (β = 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. There are frequent efforts to intervene on parenting practices, 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 uptake new information about child development versus an unrelated topic.

We asked 250 adults on Mturk to fill out the PAQ and then read four popular press
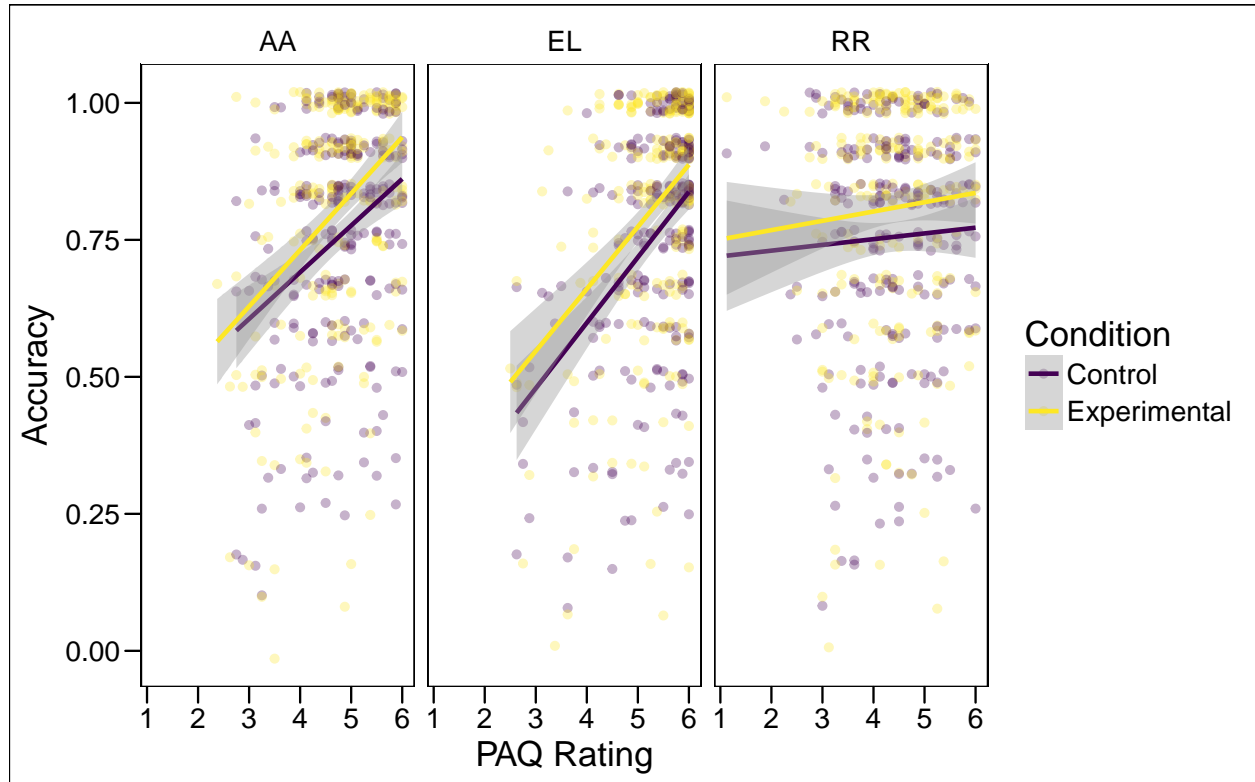
Figure 7. Relations between PAQ scores (Affection and Attachment, Early Learning, and Rules and Respect) and the uptake of information in experimental (child development-related) and control articles.

articles, two of which related to child development (**???**) and two of which related to other science topics (**???**). 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). We were specifically interested in whether participants who agreed more strongly with EL attitudes would better understand and remember the information in the child development articles, which we predicted may have been consistent with their existing views of development. Participants' accuracy in relation to their average AA, EL and RR scores is displayed in Figure 7.

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.

To assess 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.

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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