



# Latina/o Parents' Role in Youth's STEM Identity, Self-Efficacy, and Competence

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# Background

- Low percentage of adults earning degrees and pursuing careers in science, technology, engineering, and mathematics (STEM) (NAE, 2011; NSB 2012; NSF, 2015)
  - Increase in the number of available STEM careers, many going unfilled (My College Options & STEMconnector, 2012)
- Ethnic-racial and gender disparities in STEM careers endangering sustainability of technology-based U.S. society (NSF, 2010)

# Latino Population

- A large and growing population in U.S. schools
  - 25% of U.S. students (Fry & López, 2012)
- Positive indicators of educational and occupational wellbeing have not kept pace with population increase
  - Low representation in courses that prepare for postsecondary academic success (Riegler-Crumb, 2006)
  - Receive fewer degrees in STEM (National Science Board, 2008)

# Expectancy-Value Theory of Academic Motivation

- Early beliefs and experiences shape later educational and occupational trajectories (Heckman, 2006)
- Academic ability beliefs and subjective task values precursors of academic achievement and career trajectories (Eccles & Wigfield, 2002)
  - Ability beliefs – perceptions of competence in academic domain
  - Subjective task values – utility value, such as usefulness, importance, interest

# Role of Parents

- Children's achievement-related beliefs do not develop in isolation
  - Children's perceptions of academic competence appear to be strongly influenced by parents' attitudes, stereotypes, and beliefs about child ability (Frome & Eccles, 1998; Jacobs, 1991; Simpkins et al., 2012)

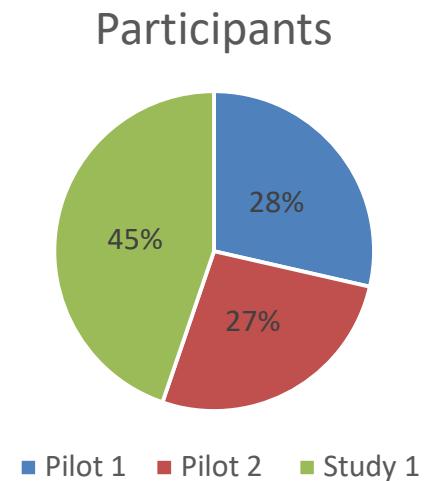
# Research Questions

1. What is the role of parents' self-efficacy and engineering-related beliefs in young children's engineering-related ability and subjective value beliefs among Latino families? (Arellano & Padilla, 1996; Eccles et al., 1998)
2. Does parental warmth strengthen associations? (Darling & Steinberg 1993; Lowe & Dotterer, 2013; Wigfield et al., 2015)
3. What is the role of youth gender? (Alegria & Branch, 2015)

# Equity in Engineering Study

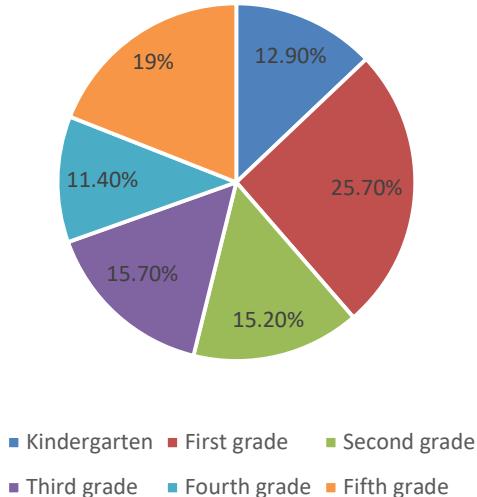
- Original study
  - Two pilot studies and one longitudinal study (Study 1-2; Waves 1, 2, and 3) conducted in the Southwestern U.S.
  - Investigates elementary school children's knowledge of and motivation to engage in engineering, as well as ethnic, developmental, and gender differences in these constructs

- Current Study
  - 210 Latina/o K-5 students (Pilots & Study 1)  
 $M_{age} = 7.92$ ,  $SD_{age} = 1.93$ ; 54% female
  - Parents (85% mothers)
  - Inclusion criteria: parents identified the student or self-identified as Latina/o

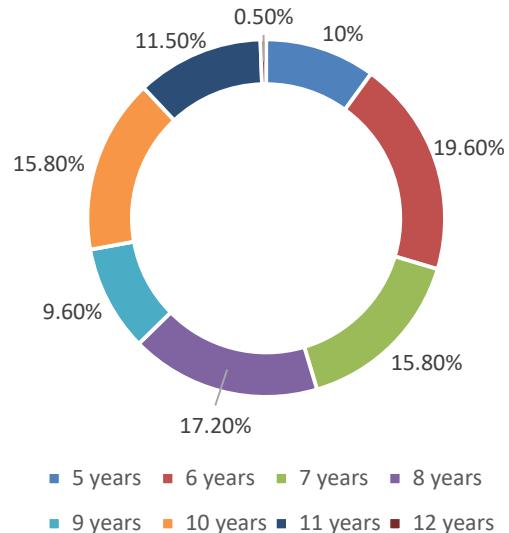


# Equity in Engineering Study: Demographics

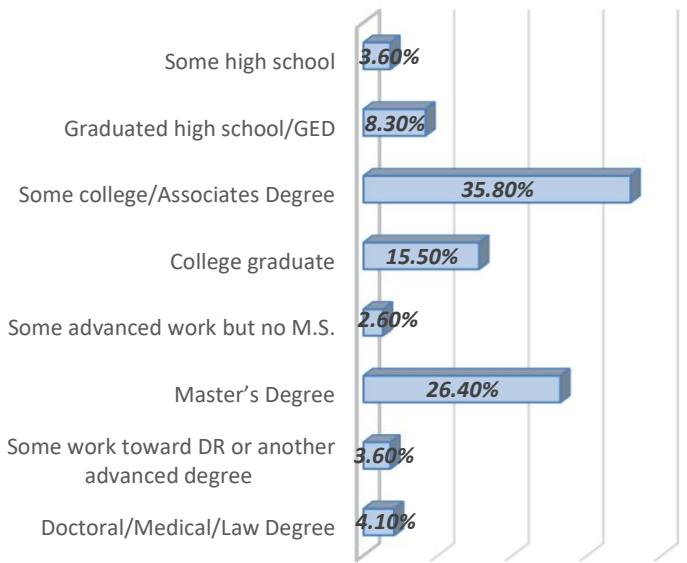
Child Grade distribution



Child Age distribution



Family's highest educational attainment



Parent preferred language: 81% English; 18% Spanish; 0.5% Either; 0.5% Other ( $n = 185$ ).

# Child Report Measures: Dependent Variables

Construct	Measure	# Items	Example Items	Response Scale
Ability Beliefs	Engineering-Related Competency	8	<ul style="list-style-type: none"> <li>• How good are you at asking why things work?</li> </ul>	0 ( <i>Not at all good</i> ) to 3 ( <i>Very good</i> )
Subjective Task Values	Engineering-Related Interest	8	<ul style="list-style-type: none"> <li>• How much do you like taking things apart and putting them back together?</li> </ul>	0 ( <i>Not at all</i> ) to 3 ( <i>A lot</i> )
	Self-Importance of Engineering-Related Activities/Skills	8	<ul style="list-style-type: none"> <li>• How important is it for you to be good at trying out your ideas?</li> </ul>	0 ( <i>Not at all important</i> ) to 3 ( <i>Very important</i> )
	Engineering-Related Career Interests	8	<ul style="list-style-type: none"> <li>• When you grow up, how much would you like a job where you ask why things work?</li> </ul>	0 ( <i>Not at all</i> ) to 3 ( <i>A lot</i> )

# Parent Report Measures: Independent Variables

Construct	Measure	Items	Example Items	Response Scale
Self-efficacy	Parental Self-Efficacy related to Engineering-Related Activities and Skills	8	<p>How confident do you feel in your ability to help your child in each of the following activities/skills?</p> <ul style="list-style-type: none"> <li>• Taking things apart and putting them back together?</li> </ul>	0 ( <i>Not at all confident</i> ) to 3 ( <i>Very confident</i> )
Ability Beliefs	Child Competency in Engineering-Related Activities and Skills	8	<p>How good is your child at:</p> <ul style="list-style-type: none"> <li>• Coming up with plans to make things work?</li> </ul>	0 ( <i>Not at all good</i> ) to 3 ( <i>Very good</i> )
Subjective Task Value	Parental Importance of Engineering-Related Activities and Skills	8	<p>How important is it to you that your child does well at:</p> <ul style="list-style-type: none"> <li>• Asking why things work?</li> </ul>	0 ( <i>Not at all important</i> ) to 3 ( <i>Very important</i> )

# Parent Report Measures: Moderators

Construct	Measure	Items	Example Items	Response Scale
Parental Warmth	Parental Reports of Parental Behavior: An Inventory (Schaefer, 1965)	8	<ul style="list-style-type: none"><li>• You spoke to your child in a warm and friendly voice</li><li>• You understood your child's problems and worries</li></ul>	0 ( <i>Almost never</i> ) to 3 ( <i>Almost always</i> )
Youth Gender		1	<ul style="list-style-type: none"><li>• Gender (from consent form)</li></ul>	0 = Girls; 1 = Boys

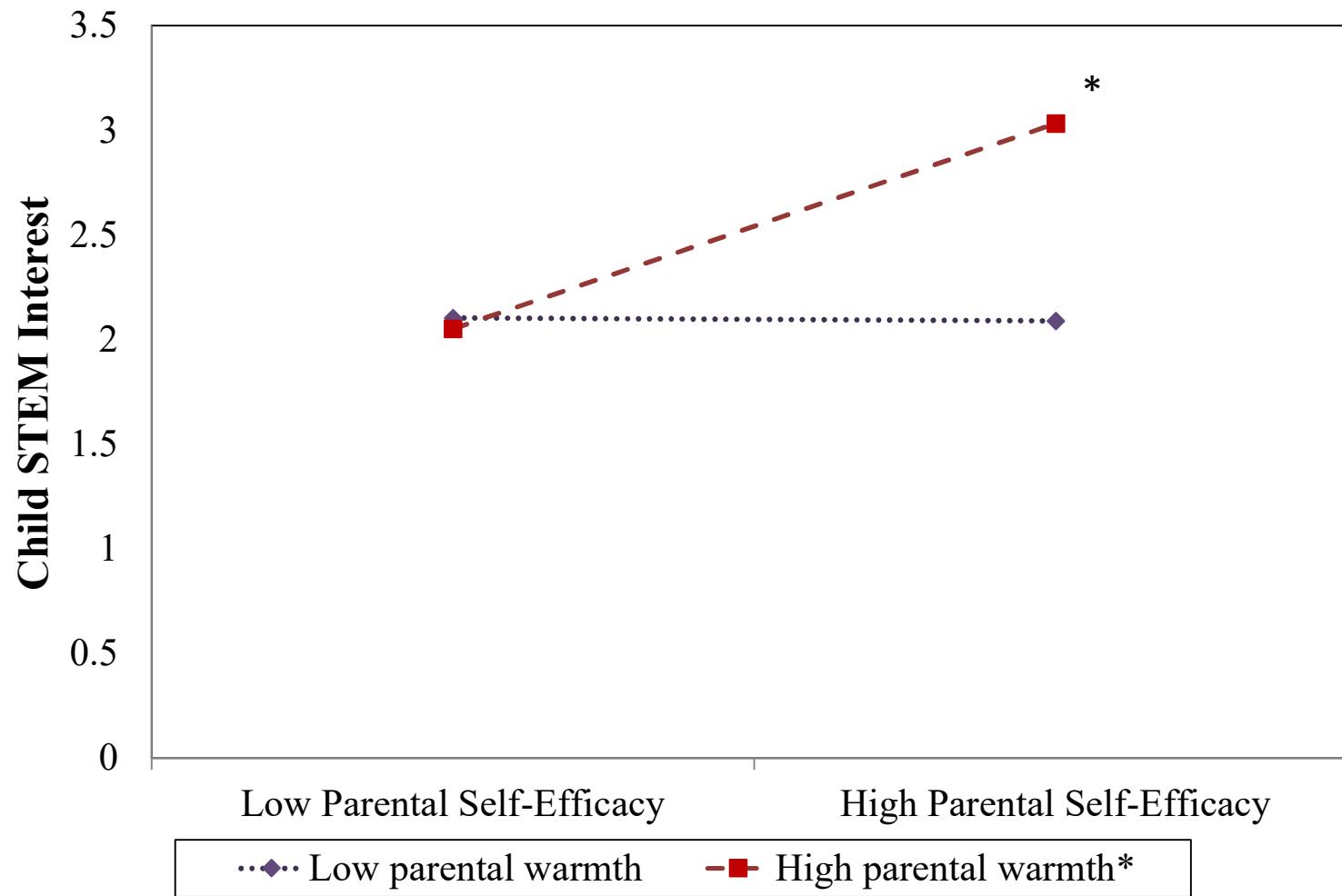
# Analytic Strategy

- Multilevel multiple regression using SAS®9.4
  - Children clustered within parents
    - Higher-level (Level-2) parent variables grand-mean centered
  - Three regression models for each outcome
    1. No moderators
    2. Warmth as moderator
    3. Youth gender as moderator
  - Covariates
    - Family educational attainment
    - Parent and youth gender
    - Parent's expectations for child's educational attainment

# RQ1 Results: Role of Parents' Self-Efficacy & Beliefs

- ↑ family educational attainment related to ↑ child reported engineering activity/skill competency
- ↑ parent self-efficacy related to ↓ child reported engineering activity/skill importance

## RQ2 Results: Moderation of Parental Warmth



# RQ3 Results: Moderation of Youth Gender

- For boys, but not girls
  - ↑ parent-rated importance of engineering-related activities ↓ boys' interest in engineering-related activities
  - ↑ parent expectations for child's educational attainment related to ↑ boys' engineering-related career interest

# Discussion

- Family educational attainment related to children's perceived engineering-related competence
  - Suggesting an advantage of these family contexts
- Overall, high parent self-efficacy related to lower children's perceived engineering-related importance

# Discussion

- Context of high parental warmth important
  - When parents have high self-efficacy and are warm, they may also engage in engineering-related activities with their kids that promote ability and interest
- Children's gender matters
  - Parental importance relates to boys' lower current interest in engineering-related activities
  - Parents' educational expectations relate to boys' higher career interest

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