ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

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# Report of a Survey of Early Career Latinx Engineers: Trends across 3 Years in Perceptions of the Workplace, Social Cognitions, Job Satisfaction, and Turnover Intentions

**Dr. Lisa Y Flores, University of Missouri - Columbia**

Lisa Y. Flores, Ph.D. is a Professor of Psychological Sciences at the University of Missouri. She has expertise in the career development of Latinx and Latinx immigrant issues and has over 100 peer reviewed journal publications, 19 book chapters, and 3 co-edited books.

**Dr. Rachel L Navarro, University of North Dakota**

Rachel L. Navarro, Ph.D. is Professor of Counseling Psychology and Associate Dean for Research and Faculty Development for the College of Education and Human Development at the University of North Dakota (UND). She is the former department chair for UNDâ€

**Jinkoo Lee, University of Missouri - Columbia**
**Dr. Bo Hyun Lee, The Ohio State University**

Dr. Lee's research broadly focuses on equity, justice, and access both at work and in pursuit of work. Dr. Lee takes an intersectional approach to understanding the influence of oppression and marginalization on academic achievement and career development among members from oppressed groups. With her focus on cultural and contextual influence on individuals' career development, Dr. Lee addresses inequities in STEM by investigating a variety of cultural and contextual factors while striving to name and the structural inequity within the system, including higher education, that could guide the culturally and contextually sustaining intervention and support for the oppressed groups.

**Han Na Suh, Georgia State University - Perimeter College**
**Dr. Sarah Lynn Orton P.E., University of Missouri - Columbia**

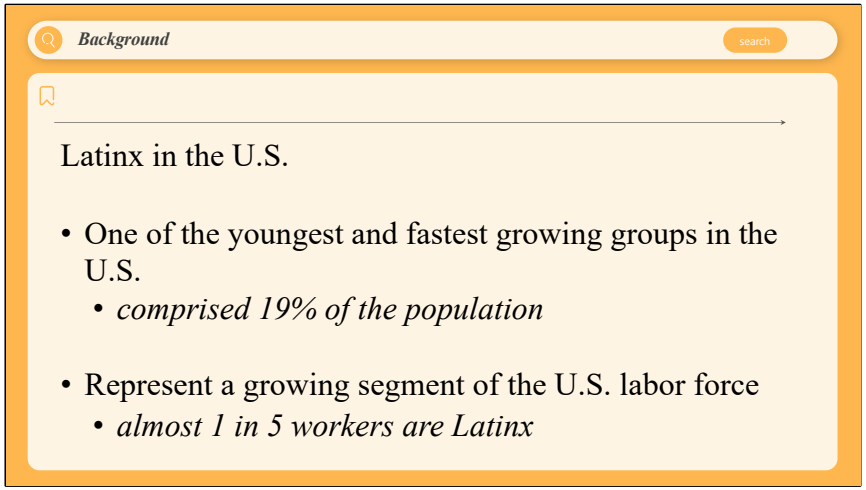
Dr. Orton is an associate professor in Civil Engineering and is an active member of the American Concrete Institute and the American Society of Civil Engineers. Dr. Orton also serves as the Director of Undergraduate Studies for the Civil and Environmental

**Dr. Pat Garriott**

Dr. Garriott received his PhD from the University of Missouri. He is a member of the American Psychological Association (APA), Division 17 (Counseling Psychology) of the APA, and the Society for Vocational Psychology. His work has been recognized by Divi


We are Lisa Flores & Rachel Navarro and co-Pis on an NSF project that we will be sharing some findings of this project today. The major aim of this project is to investigate the longitudinal effects of contextual, cultural, and social cognitive factors on work engagement, satisfaction, and persistence of Latinx engineers during the college-to-work transition and early career years.

We are collecting data from early career engineers who self-identify as Latinx via an annual survey, weekly experiential surveys that are conducted 4 consecutive weeks annually, and individual interviews. In today's presentation, I will present trends in Latinx engineers' self-reports of their perceptions of the work environment, social cognitions, job satisfaction, and turnover or persistence intentions.

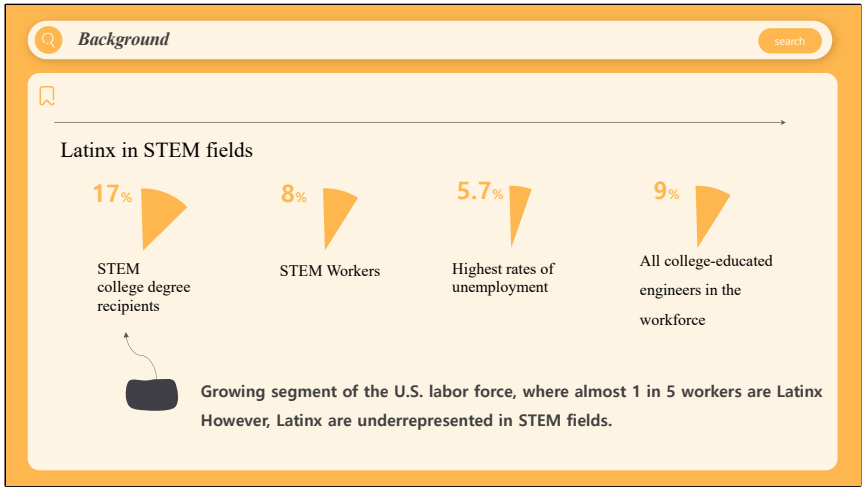



We will start by providing a context for this group and why more research is needed on Latinx in engineering.

Latinx are the youngest and one of the fastest growing groups in the US, comprising 17% of population.

They accounted for a significant proportion of the population growth since 2000 and are projected **to comprise 30% of population by 2050.**

These trends are reflected in our public schools, where their representation is increasing. And they are a growing segment of the US labor force…where almost 1 in 5 workers in the workforce today are Latinx.




Let's contrast this to their representation in STEM fields.

Latinx are underrepresented in STEM, and their representation decreases at each successive stage. Latinx receive 17% of all STEM college degrees, but represent only 8% of workers in STEM fields and 9% of engineers in the workforce. STEM degree recipients also have one of the highest rates of unemployment.

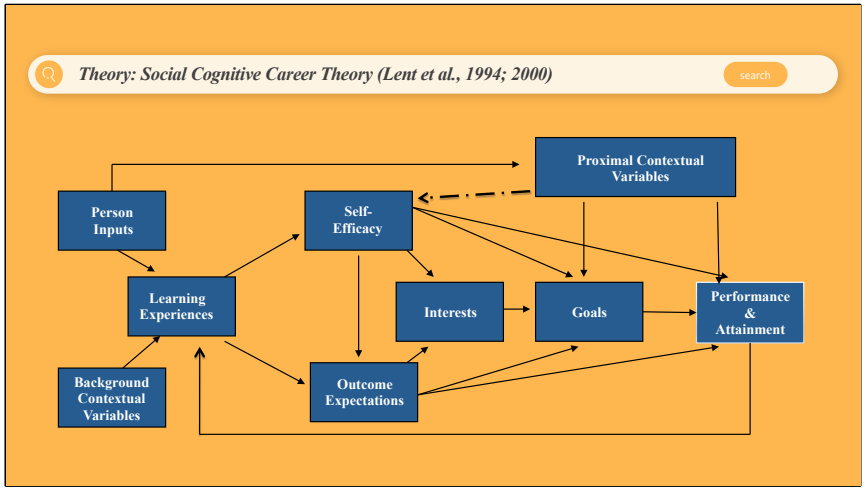
The retention of those who enter is critical given that so few enter the field in the first place.

At the same time, the Bureau of Labor Statistics projects an increase in STEM jobs in the future.

Latinx represent an untapped STEM talent pool, and the problems of **underutilizing this talent in engineering and other STEM fields will be exacerbated as Latinxs grow.**

We need to train diverse STEM workers **to keep up with the industry demands & to keep the US competitive on**

**the global market**. **Recruiting and retaining a diverse STEM workforce is one route to address these issues.**




Let's shift now to describing the theory that has guided our research.

We have **theories that explain how people make career choices** and adjust to careers. One of the most influential vocational theories today is Social Cognitive Career Theory. Built around Bandura's social cognitive theory, SCCT includes 3 interrelated models that **explain determinants of educational and occupational interests, goals, and performance**.

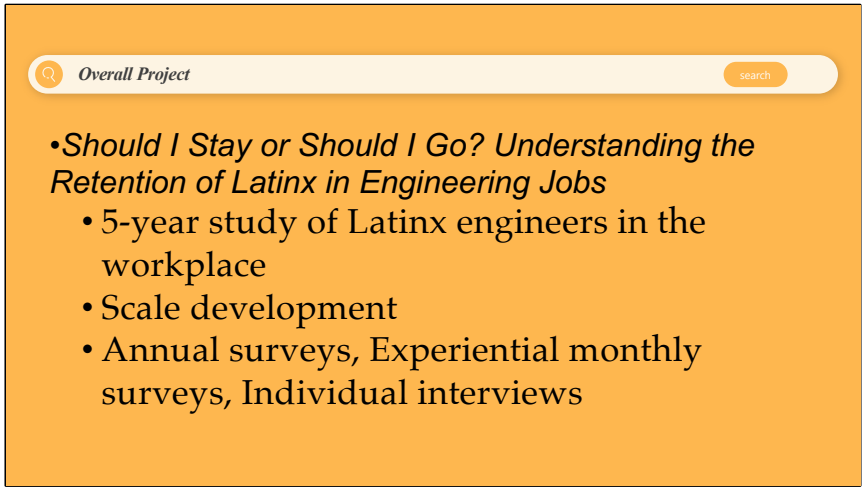
SCCT posits that there are multiple pathways through which people develop career interests, goals, and experience success in work activities—including social cognitive factors, individual and contextual factors.

*SCCT is a domain-specific theory, which focuses on individual behaviors in specific areas. This raises some measurement challenges because to test the model, one needs to use measures that are tailored to the specific behavioral domain of interest. For instance, one might use SCCT to understand choice of math majors or difficulty in making career decisions—each of these would use a different SCCT model and would require a different set of*

*domain specific measures to assess SCCT constructs.*

**SCCT has been one of the most widely used theories** in educational and vocational research for two reasons. One is that research has demonstrated that social cognitions are modifiable through interventions.

A second reason is its capacity to address equity issues in school and work domains because it accounts for the role of context in shaping career behaviors and outcomes. *(Contextual affordances, LE)*



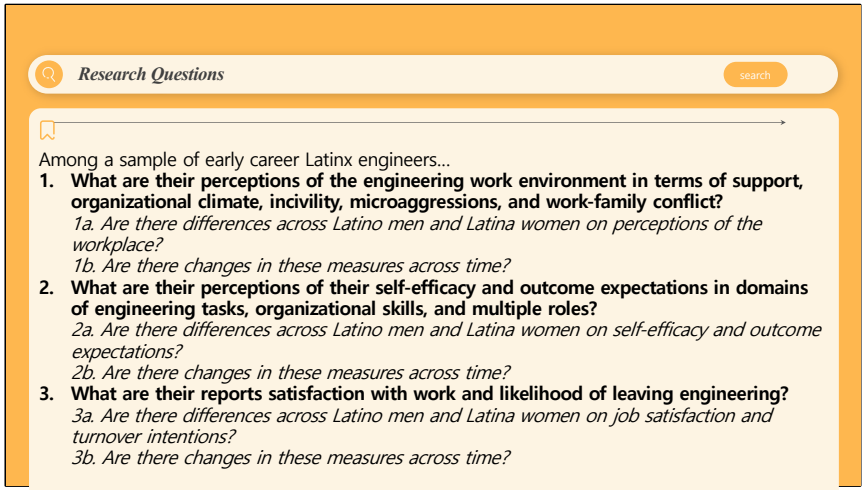

Today, I will be presenting data from the first three years of our annual survey, but this highlights other activities we are doing in this project.

We have developed a measure to assess engineering interests among adult workers; we are analyzing data from qualitative interviews; and we are conducting model testing using social cognitive career theory as our theoretical framework.

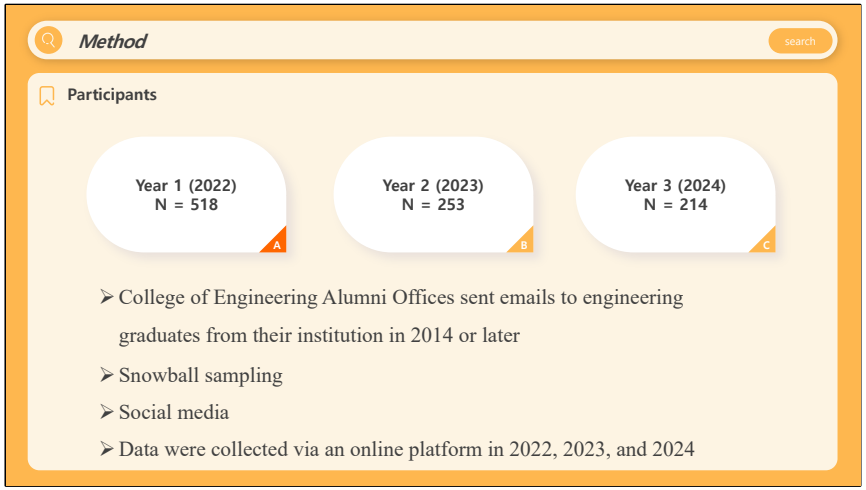
For model testing, we hypothesize that the relations among contextual, cultural, and social cognitive factors will explain a significant amount of variance in work engagement, satisfaction, and persistence. We are using structural equation modeling (SEM) to examine this hypothesis longitudinally. We will assess the SCCT model's generalizability intersectionally (Latina vs. Latino) via SEM multigroup analyses.

We are using qualitative and experience sampling methodologies to gather fine-grained snapshots of perceived workplace climate to examine the effects of momentary and longitudinal changes in such contextual factors on work

engagement, satisfaction, and persistence.




These are the research questions for this study. Specifically, we are interested in assessing early career Latinx engineers' perceptions of the work environment, self-efficacy and outcome expectations, and job satisfaction and turnover intentions. We examine gender differences across men and women on these constructs and changes across time.



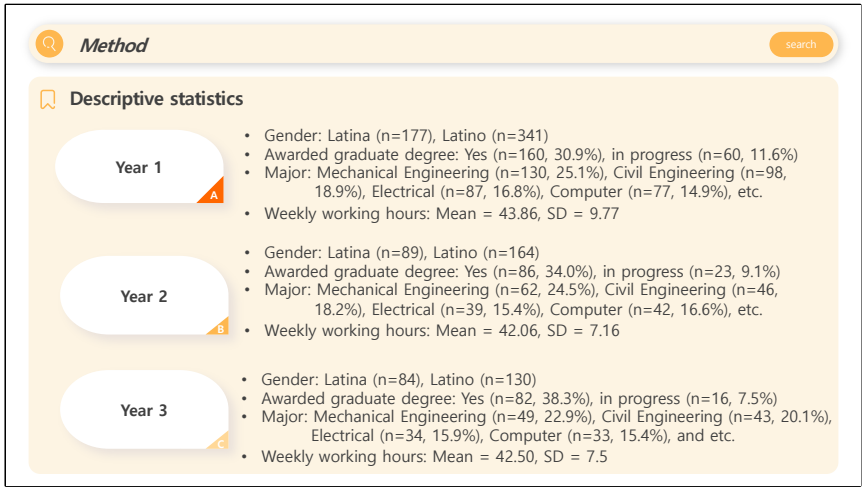

As mentioned earlier, we will be sharing findings from an ongoing NSF supported project that is researching the work experiences of Latinx engineers in the early stages of their careers in the labor force. We identified early career engineers as individuals who had received their undergraduate degrees within 10 years at the time of the study.

To date, we have collected 3 waves of annual data from an online survey. At Time 1, we recruited 518 early career Latinx engineers, and 253 and 214 at Times 2 and 3, respectively.

We have utilized different approaches to recruit participants, including sending emails to Latinx engineering graduates since 2014 at partner institutions, sending invitations to participants from earlier studies that we conducted when they were in college, and via social media announcements. We also utilized SHPE membership lists and that yielded a few participants to the study.

We have reached out to our Time 1 participants in subsequent years of the project and are continuing to try to recruit

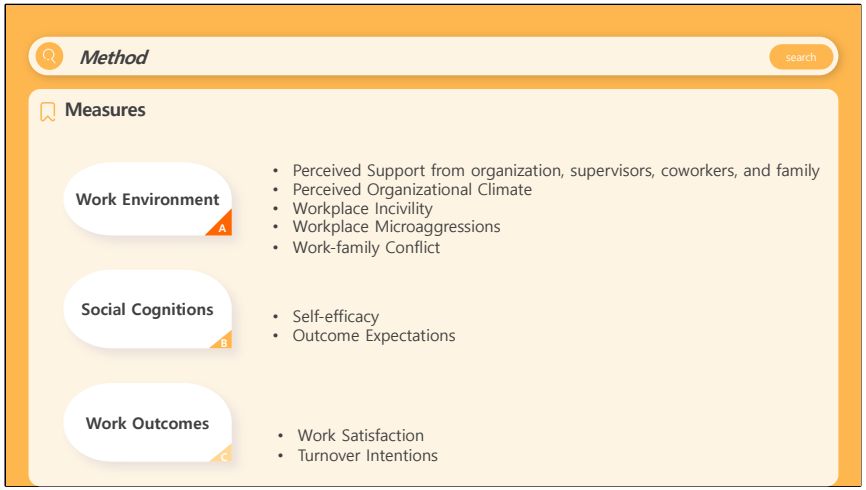
new participants to the study.



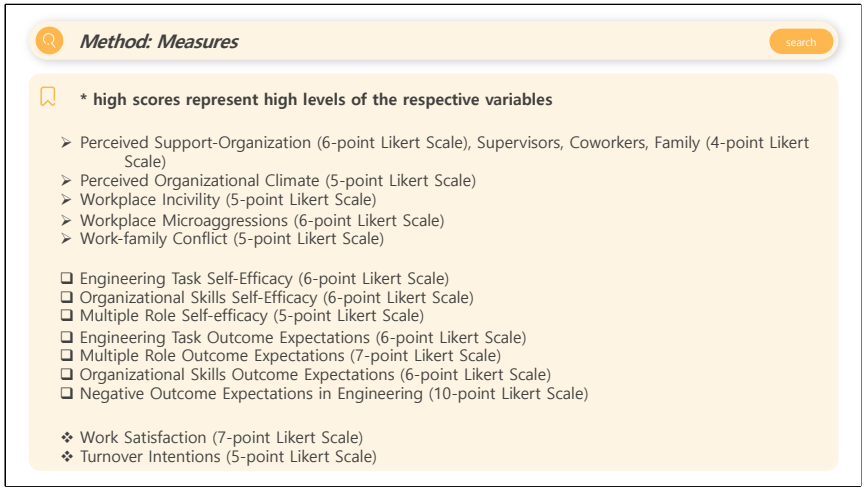

This is an overview of the demographics of our samples across each year. All participants received an undergraduate degree in engineering since 2014 or later.

At Time 1, we had 341 Latinx men and 177 Latinx women, with mechanical, civil, electrical, and computer engineering being the most represented engineering degrees. On average, the participants indicated working just under 44 hours/week, with a standard deviation of 9.7 hours.

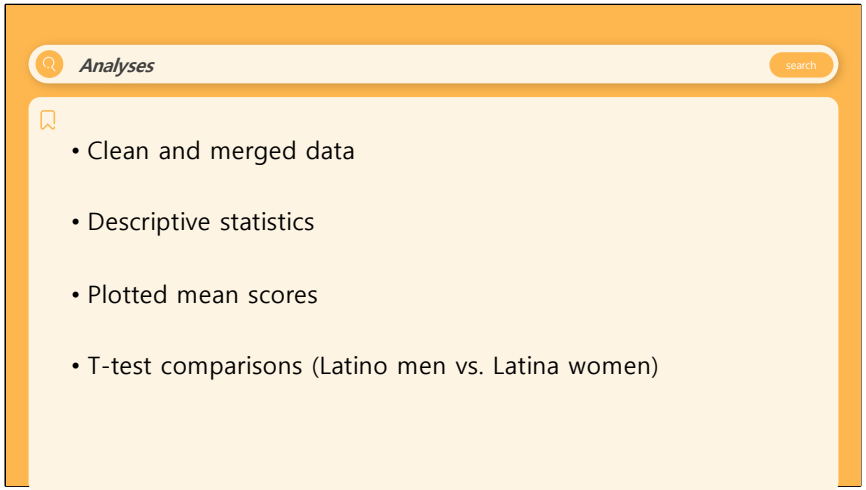
The participant demographics at Time 2 and Time 3 were similar to Time 1.




We included measures to assess perceived work environment, social cognitions of self-efficacy and outcome expectations, and work outcomes. Each of these measures were existing measures that have been validated with other samples of engineers or adult workers and have demonstrated strong reliability and validity evidence.

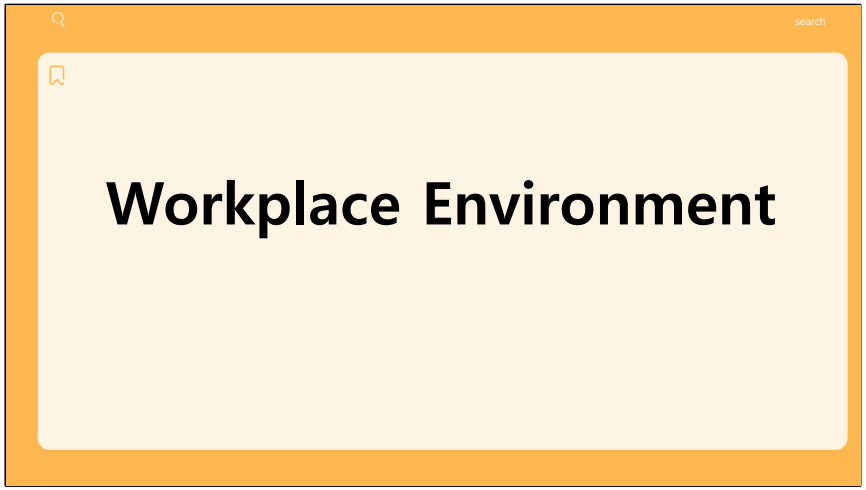



These are the names of the exact measures. Participants responded to items on the measures using Likert scales. Responses were averaged for each scale and high scores reflected high levels of the respective variables.




After cleaning the data, we performed descriptive statistics and plotted mean scores across the 3 time points to observe trends across the years. We also compared scores on all of the variables across Latino men and Latina women using t-tests.

In the following slides, I will share the findings for each of the measured variables.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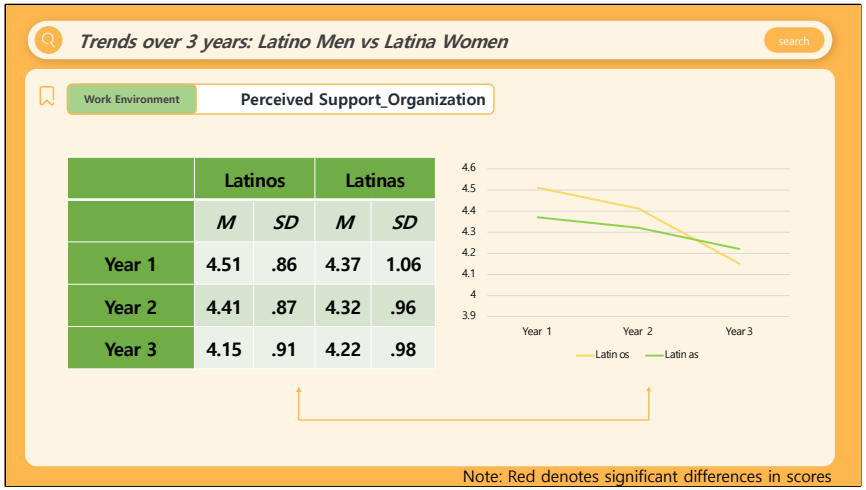
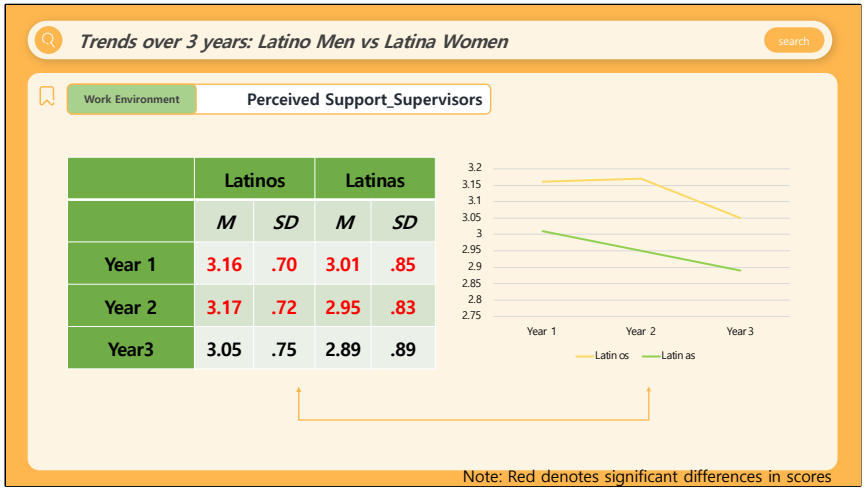
Workplace Environment




Latino men and Latina women engineers reported high moderate averages of perceived support from organizations, which declined slightly over time for both groups. There were no significant differences across men and women on perceived organizational support.



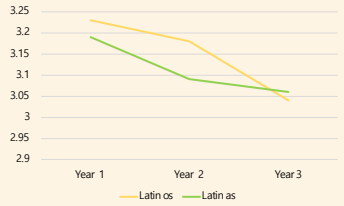

Latino men and Latina women reported high average scores on perceived support from supervisors, and these scores declined slightly over time. Latina women reported lower levels of perceived support from supervisors at Years 1 and 2 than Latino men, but there were no differences across the group at Year 3.

*Trends over 3 years: Latino Men vs Latina Women*

search

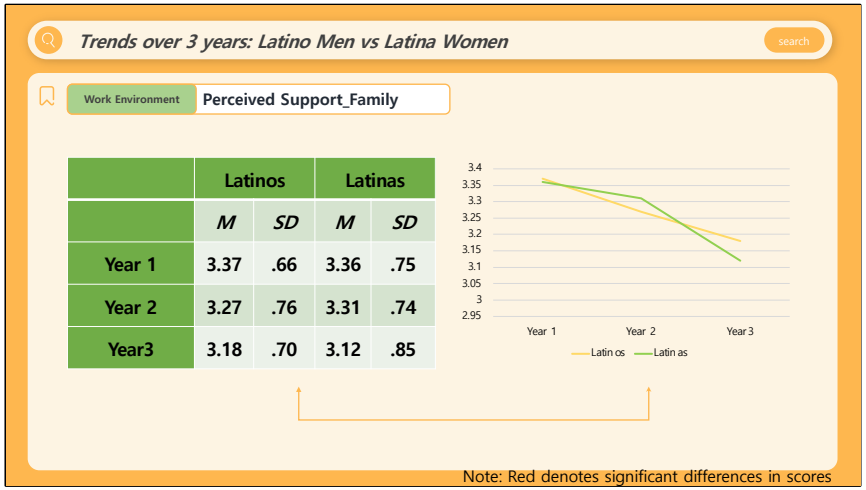
Work Environment | Perceived Support_Co-workers

| | Latinos | | Latinas | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Year 1 | 3.23 | .60 | 3.19 | .71 |
| Year 2 | 3.18 | .58 | 3.09 | .72 |
| Year3 | 3.04 | .65 | 3.06 | .68 |

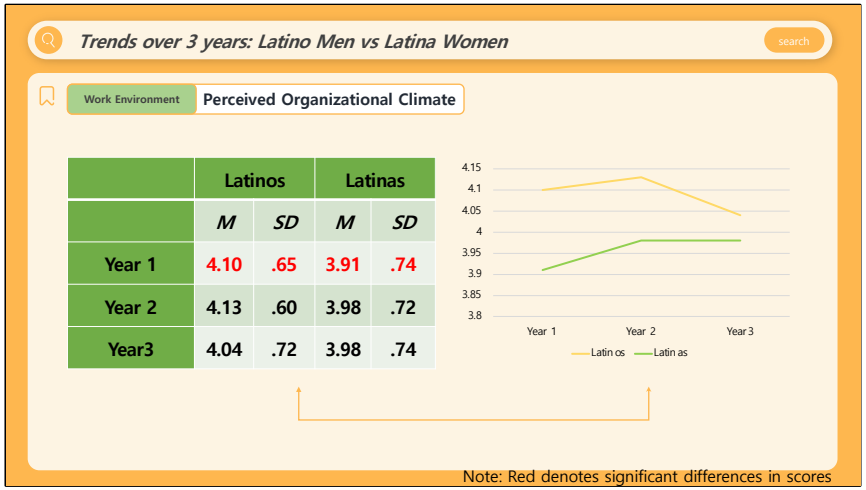



Note: Red denotes significant differences in scores

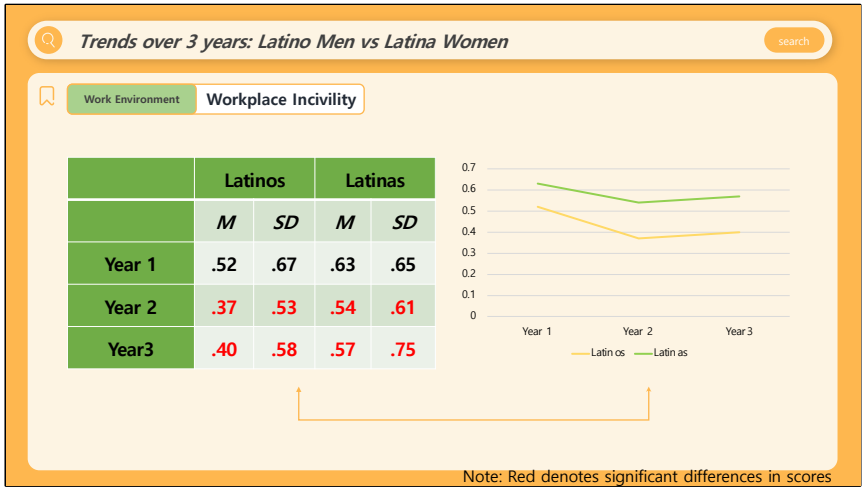
Latino men and Latina women reported high to high moderate average scores of perceived support from co-workers. These scores declined slightly over time and there were no gender differences.



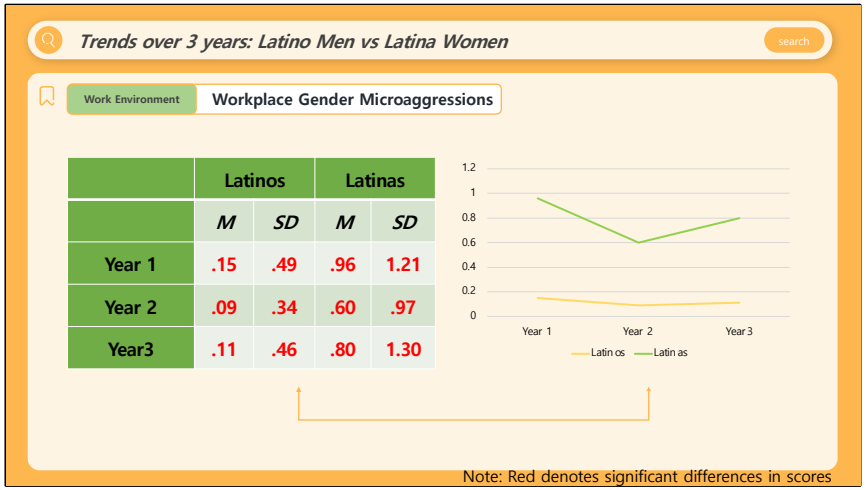

Participants also reported high average perceived support from family members. The patterns were similar to prior scales, that showed a slight decline over time but not gender differences.



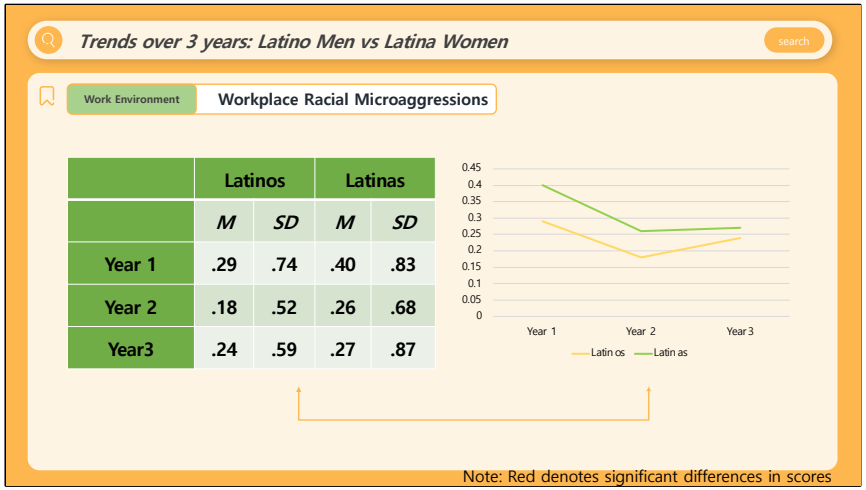

On a 5-pont scale, averages of perceived organizational climate were in the high mid ranges. Latino men reported significantly higher perceived positive organizational climate than Latina women at time 1, but there were no differences at Years 2 and 3 between Latino men and Latina women. Scores decreased slightly for men and increased slightly for women over time.




Latino men and Latina women reported low levels of workplace incivility. Women reported higher levels of experiencing workplace incivility at Years 2 and 3 than men.




Participants reported low levels of gender microaggressions at work. Latina women reported higher levels of gender microaggressions at work relative to men at all time points, and scores were relatively stable across time.




| | Latinos | | Latinas | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Year 1 | .29 | .74 | .40 | .83 |
| Year 2 | .18 | .52 | .26 | .68 |
| Year3 | .24 | .59 | .27 | .87 |

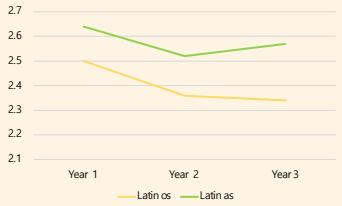
Participants reported low levels of racial microaggressions at work. There were no gender differences .

*Trends over 3 years: Latino Men vs Latina Women*

search

Work Environment | Work-Family Conflict: Time Based Work-Family

| | Latinos | | Latinas | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Year 1 | 2.50 | 1.05 | 2.64 | 1.12 |
| Year 2 | 2.36 | 1.00 | 2.52 | 1.11 |
| Year3 | 2.34 | 1.08 | 2.57 | 1.10 |




Note: Red denotes significant differences in scores

Participants reported moderate levels of work impacting family time, and there were no differences across gender groups.

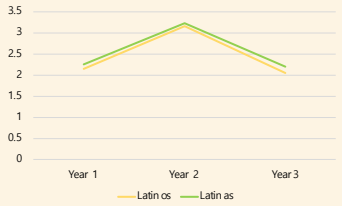
*Trends over 3 years: Latino Men vs Latina Women*

search

Work Environment

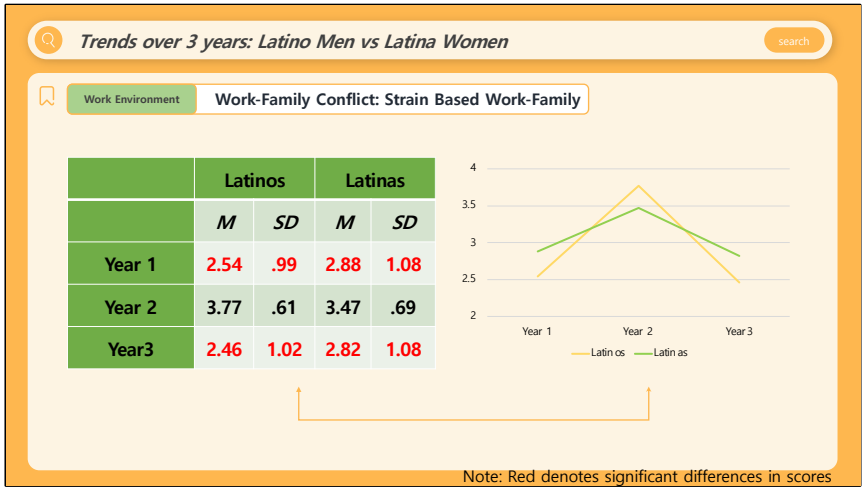
**Work-Family Conflict: Time Based Family-Work**

| | Latinos | | Latinas | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Year 1 | 2.15 | .84 | 2.26 | .92 |
| Year 2 | 3.16 | .60 | 3.23 | .73 |
| Year3 | 2.05 | .87 | 2.20 | .92 |




Note: Red denotes significant differences in scores

Participants reported moderate levels of family impacting work time, and there were no differences across gender groups in scores.



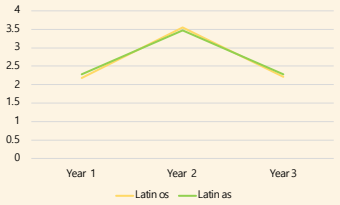

Participants reported moderate to high levels of work activities creating strain on family roles. Latina women reported higher work-family strain than Latino men at years 1 and 3.

*Trends over 3 years: Latino Men vs Latina Women*

search

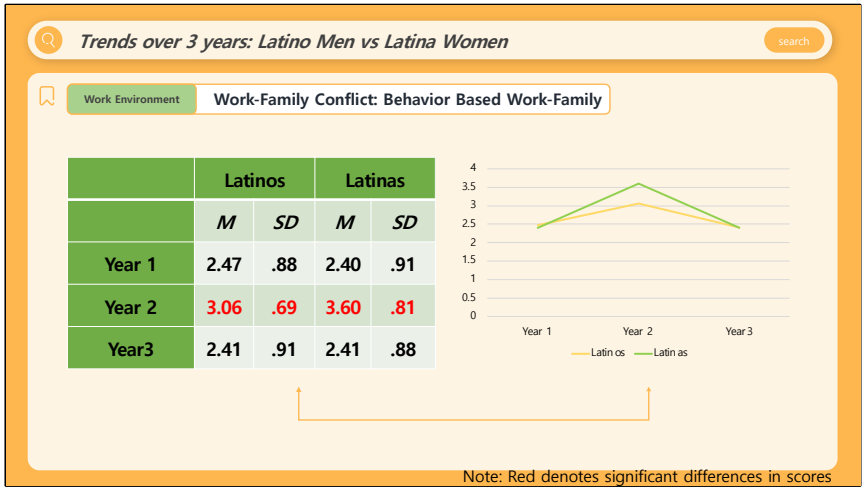
Work Environment | **Work-Family Conflict: Strain Based Family-Work**

| | Latinos | | Latinas | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Year 1 | 2.18 | .91 | 2.28 | 1.02 |
| Year 2 | 3.55 | .69 | 3.47 | .69 |
| Year3 | 2.21 | .97 | 2.28 | .96 |

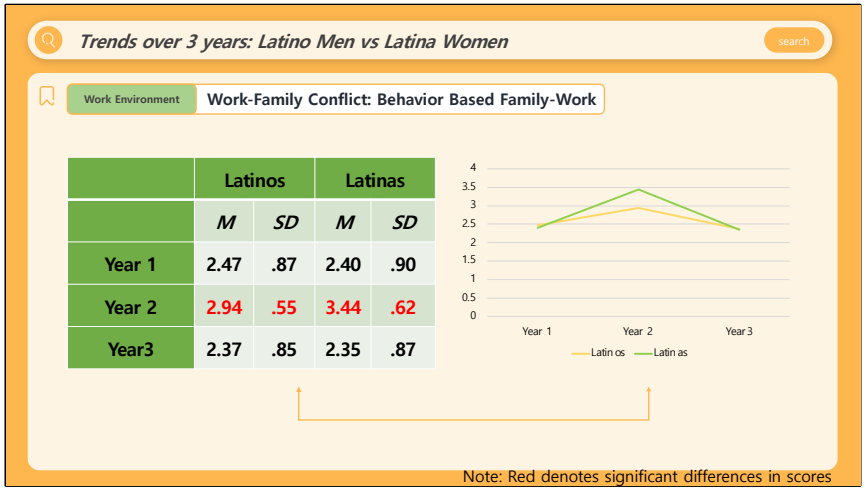



Note: Red denotes significant differences in scores

Participants reported moderate levels of family influencing work strain, and there were no gender differences.

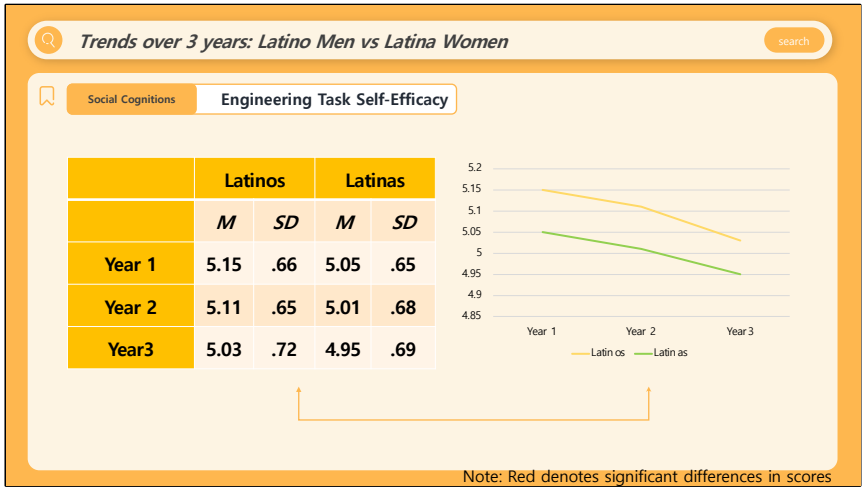



Participants reported moderate to high levels of work behaviors influencing family. Latina women reported higher levels of conflict in this area than Latino men at Year 2.

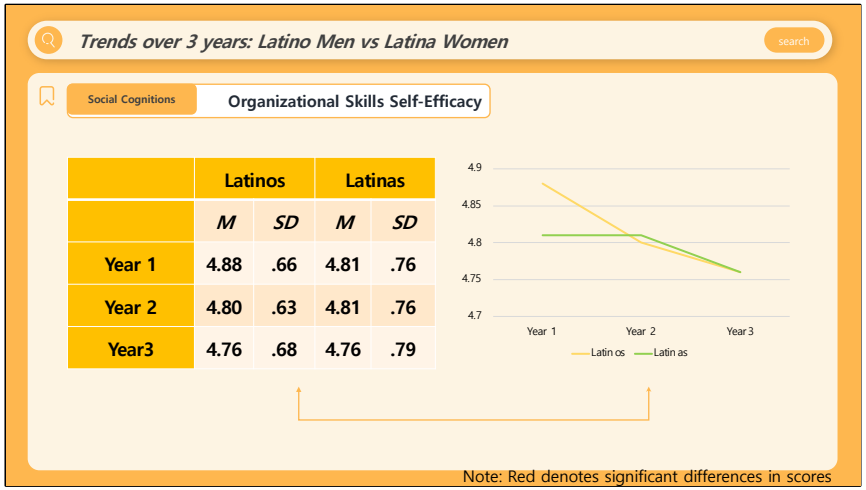



Participants reported moderate to high levels of family behaviors influencing work. Latina women reported higher levels of conflict in this area than Latino men at Year 2.

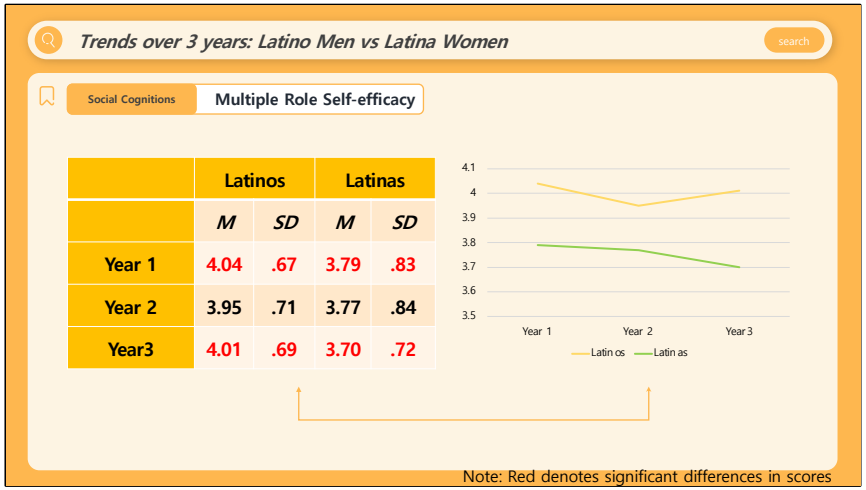

# Social Cognitions: Self-Efficacy & Outcome Expectations



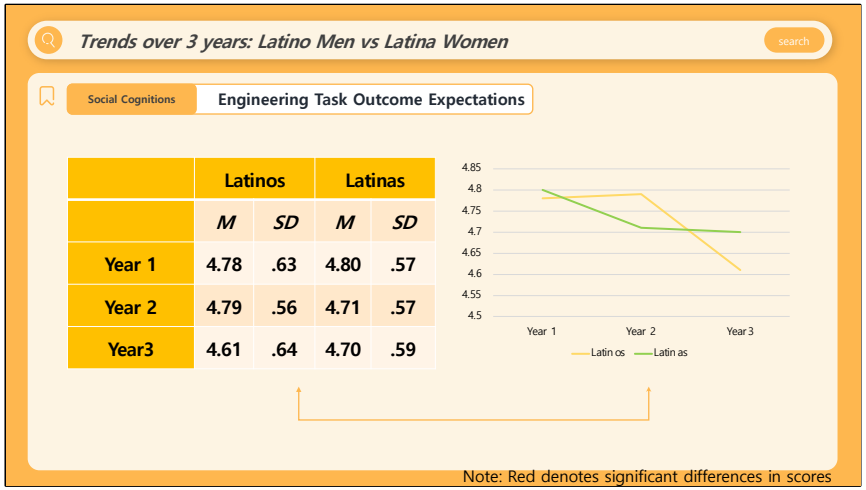

Participants reported high levels of engineering task self-efficacy. These scores decreased slightly over time, and there were no gender differences.



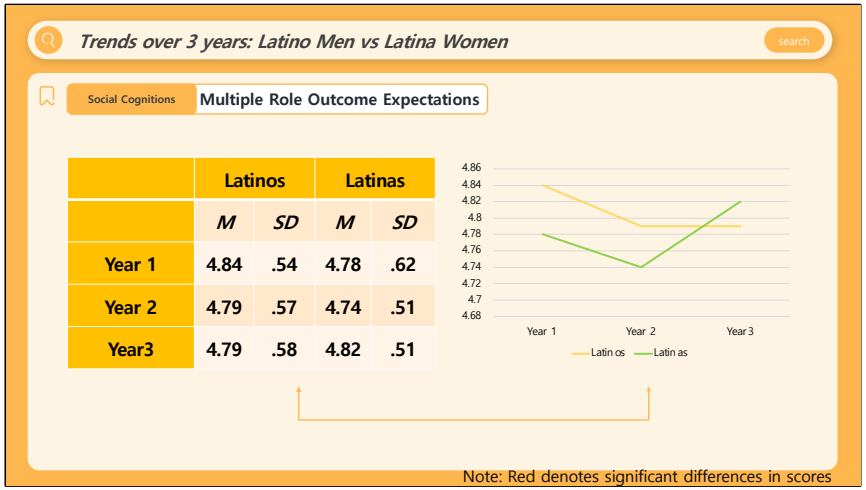

Participants reported moderately high levels of organizational skills self-efficacy, which decreased over time. There were no gender differences.




Participants reported moderately high multiple role-self-efficacy, and scores were relatively stable over time. Latina women reported lower efficacy for managing multiple roles than Latino men at Times 1 and 3.




Participants reported moderately high engineering task outcome expectations. Scores were lower at Time 3 than in Year 1, but there were no gender group differences.



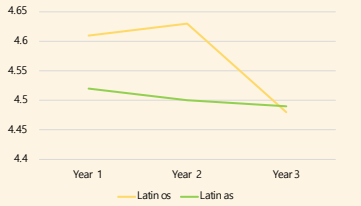

Participants reported moderate levels of outcome expectations for managing multiple roles. Scores decreased over time for Latino men, but increased for Latina women. There were no significant gender differences.

*Trends over 3 years: Latino Men vs Latina Women*

search

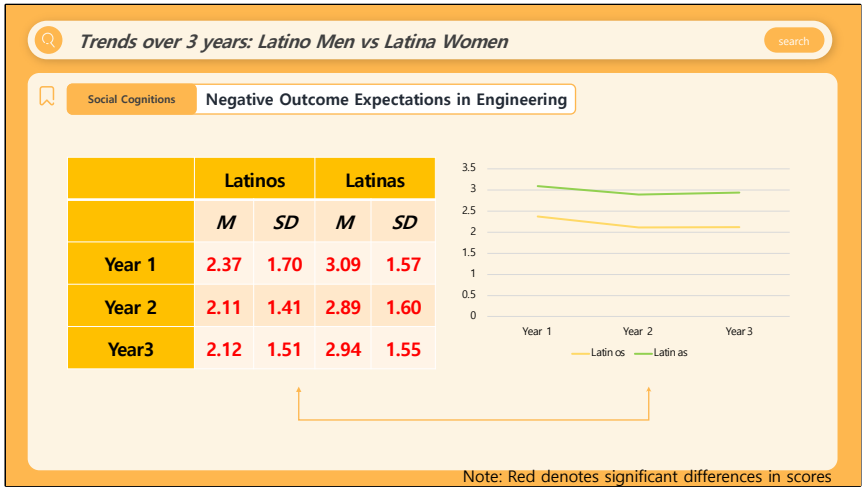
Social Cognitions | Organizational Skills Outcome Expectations

| | Latinos | | Latinas | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Year 1 | 4.61 | .54 | 4.52 | .59 |
| Year 2 | 4.63 | .51 | 4.50 | .52 |
| Year3 | 4.48 | .59 | 4.49 | .49 |

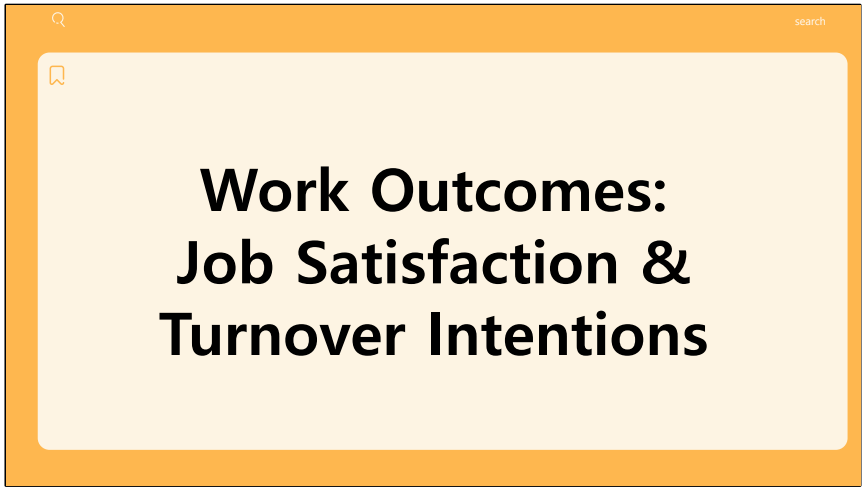



Note: Red denotes significant differences in scores

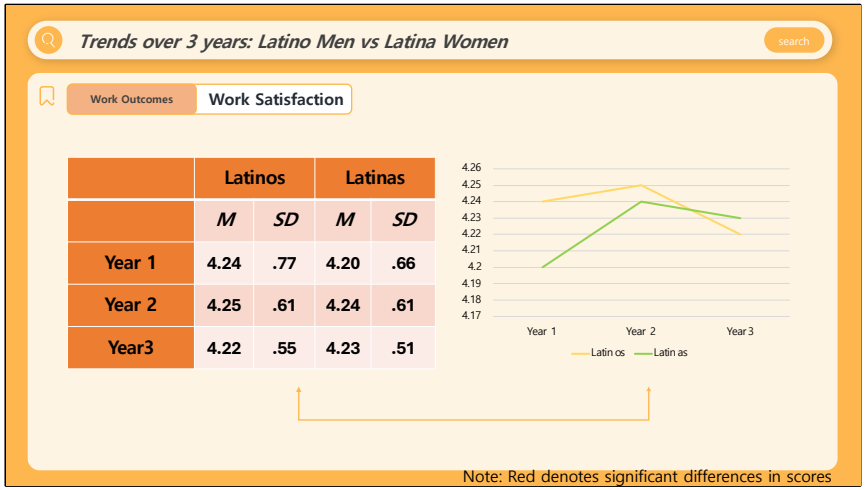
Participants reported moderately high levels of anticipated positive outcomes related to organizational skills. Scores decreased for Latino men and was stable for Latina women over time. Latino men reported higher positive anticipated outcomes than Latina women at Time 2.




Participants reported moderately low negative outcome expectations for pursuing engineering. Scores were stable, but Latina women reported higher levels of anticipated negative outcomes than Latino men for pursuing engineering.




# Work Outcomes: Job Satisfaction & Turnover Intentions



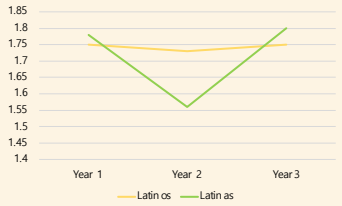

Participants reported moderate levels of work satisfaction. These scores increased slightly for Latina women and decreased slightly for Latino men over time. There were no gender differences.

*Trends over 3 years: Latino Men vs Latina Women*

search

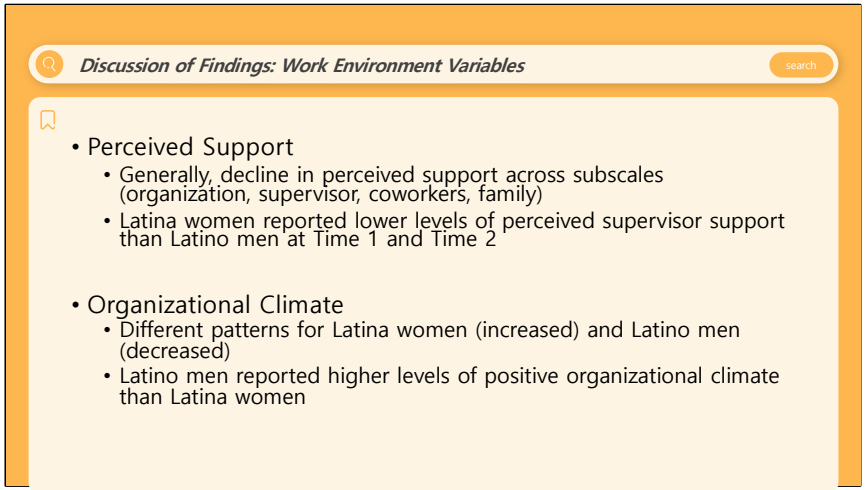
Work Outcomes | Turnover Intentions

| | Latinos | | Latinas | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Year 1 | 1.75 | .85 | 1.78 | .90 |
| Year 2 | 1.73 | .85 | 1.56 | .74 |
| Year3 | 1.75 | .92 | 1.80 | .90 |




Note: Red denotes significant differences in scores

Participants reported low levels of intentions to leave their job. Scores were stable for Latino men and decreased for Latina women at Time 2 but rebounded to Year 1 scores at Time 3. There were no gender differences in turnover intentions.

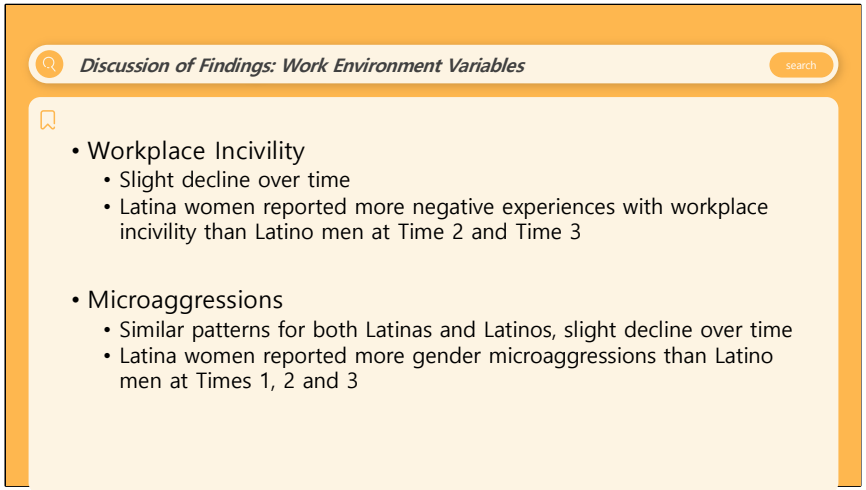



Let's summarize again the findings across the constructs.

For perceived support, there were declines in perceived support subscales across time.

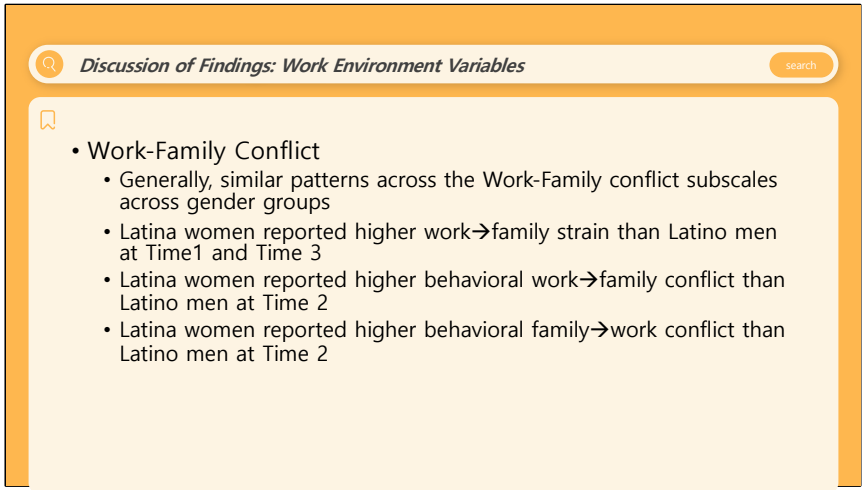
There were different patterns of scores for women and men in organizational climate.

Generally, when differences were found, women reported less support and less positive climate.



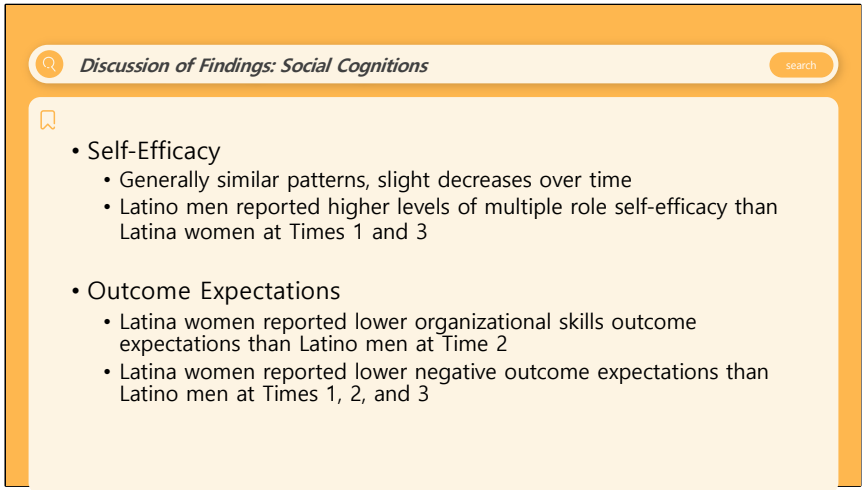

Generally, there were slight declines in workplace incivility and workplace microaggressions.

Again, when gender differences were noted, Latina women engineers reported higher levels of workplace incivility and gender microaggressions.



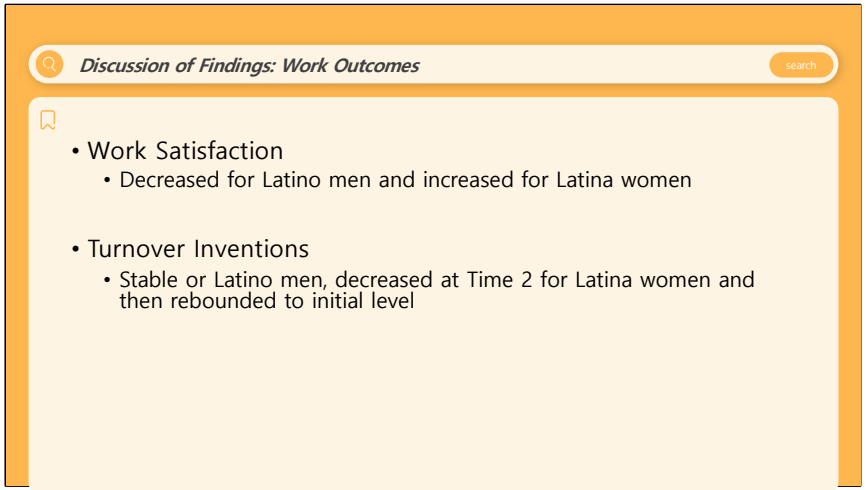

There were similar patterns across time in work-family conflict scores across groups.

When gender differences emerged, women reported higher levels of work-family conflict.




Similar patterns in self-efficacy scores.

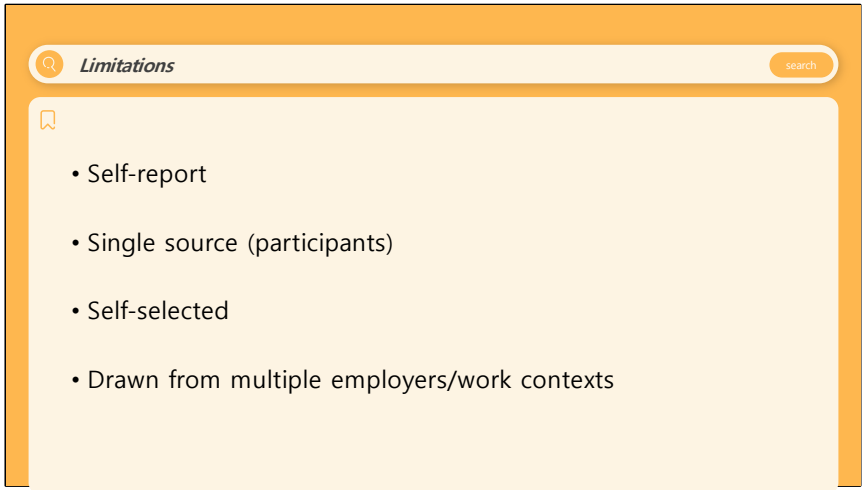
Again, when we saw differences, women reported lower self-efficacy, lower positive outcomes and higher negative outcomes.



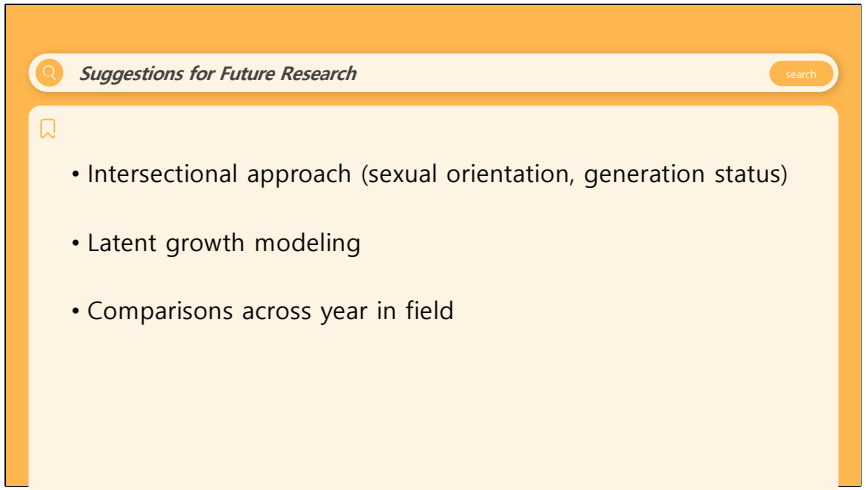

Work satisfaction levels increased for women but decreased for men.

Turnover intentions were stable for men, and decreased for women but rebounded to initial levels.

No gender differences were noted in either of these variables.



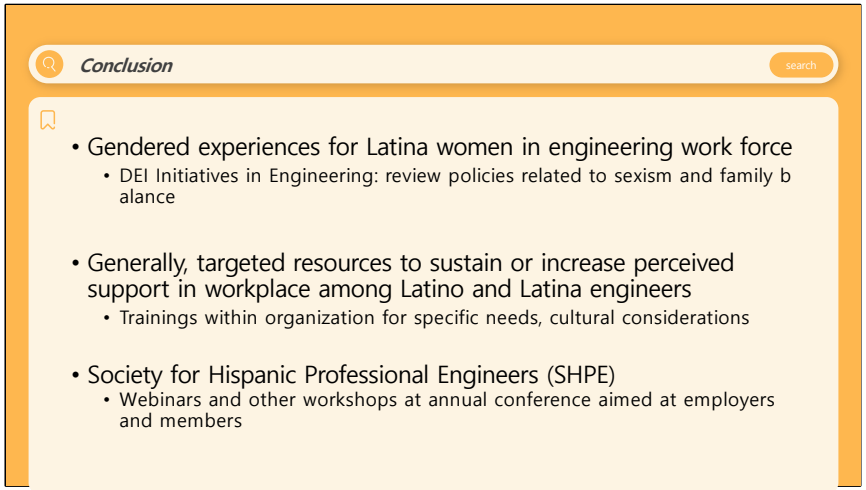

There are some limitations to this study that we should highlight, including that we obtained self-reported data from a single source, participants self-selected to participate in the study, and participants were drawn from multiple work environments.




Future research can consider factors that could be influential in job satisfaction and retention, such as intersecting identities (e.g., sexual orientation; generation status; race) and job location (rural vs urban or close to family versus far from family).

More advanced analyses can be used to track individual trajectories on the variables.

Finally, future research can examine differences among early career Latinx engineers based on time in the field (i.e., those who are within first 3 years post-graduation; 4-6 years post-graduation, and 7-10 years post-graduation).




The findings highlight gendered experiences for Latina women engineers in the workplace.

What does this mean?
Employers can: (1) conduct anonymous surveys with workers to assess perceived gender biases at work and (2) conduct a careful review of workplace policies that might favor men in the workplace and include implicit biases for women and make efforts to modify these policies. DEI initiatives in engineering should attend to the gendered experiences for Latina engineers that present challenges in the work environment for these workers.

Employers can also identify programs and resources that can benefit and support Latinx workers. For example, provide trainings to supervisors on cultural humility and considerations for diverse workers.

Professional organizations, like SHPE, might develop webinars that are targeted toward Latina women members that address workplace stressors. Importantly, these organizations can also provide trainings for industry workers to improve workplace systems for Latinx workers.

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# Questions?