



University of California  
San Francisco



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Gift It Forward Study

# Why does BSP Work?

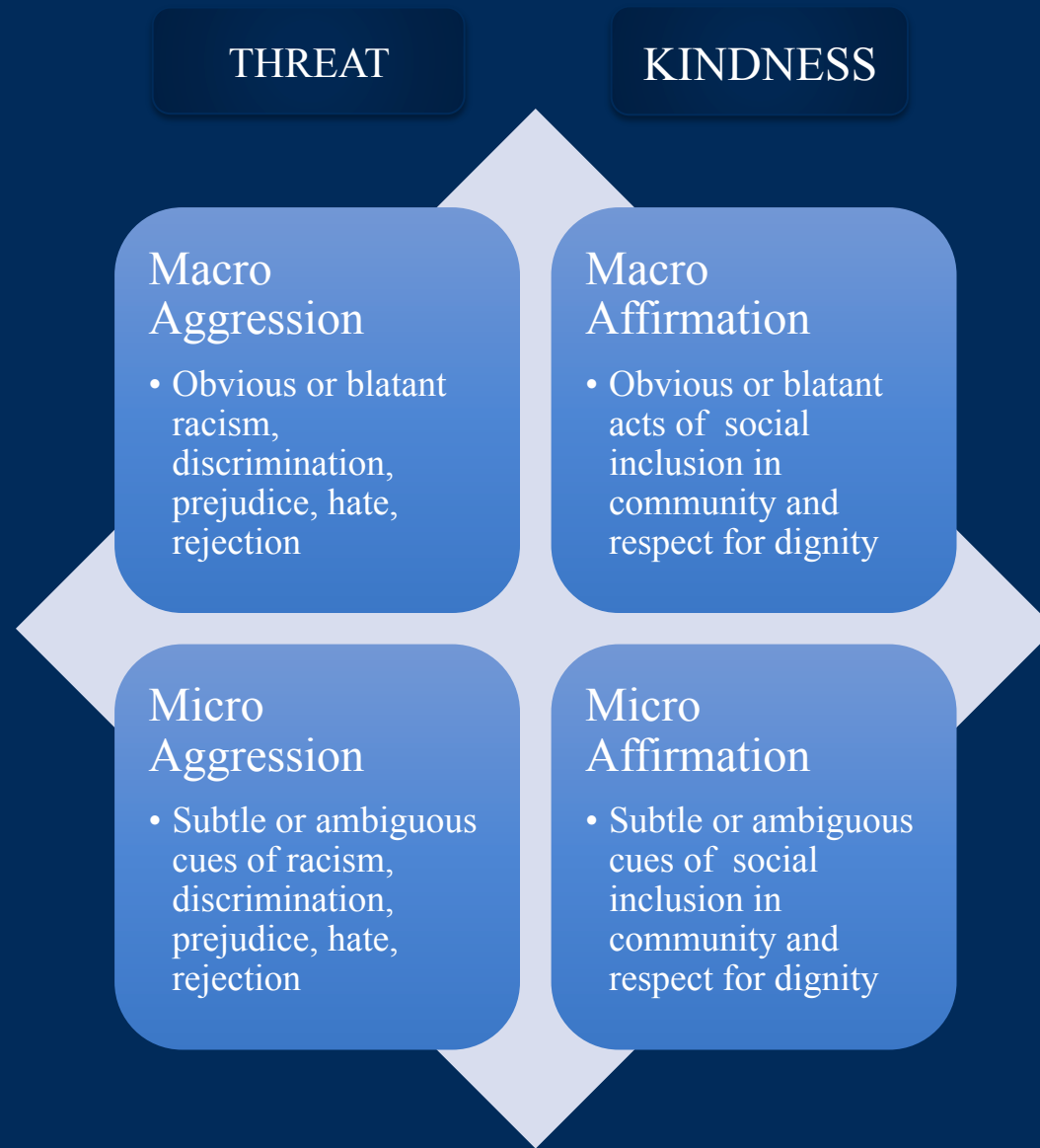
## The Gift It Forward Study & Lessons for Institutional Change

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Department of Social and Behavioral Sciences & IHA  
UC San Francisco

Funded by



Given at 3<sup>rd</sup> Annual UCB Conference on Broadening Participation



## Prejudiced Institutional Environment

High Macro Aggression

High Micro Aggression

Low Macro Affirmation

Low Micro Affirmation

## Ambiguous Institutional Environment

Low Macro Aggression

High Micro Aggression

High Macro Affirmation

Low Micro Affirmation

## Inclusive Institutional Environment

Low Macro Aggression

Low Micro  
Aggression

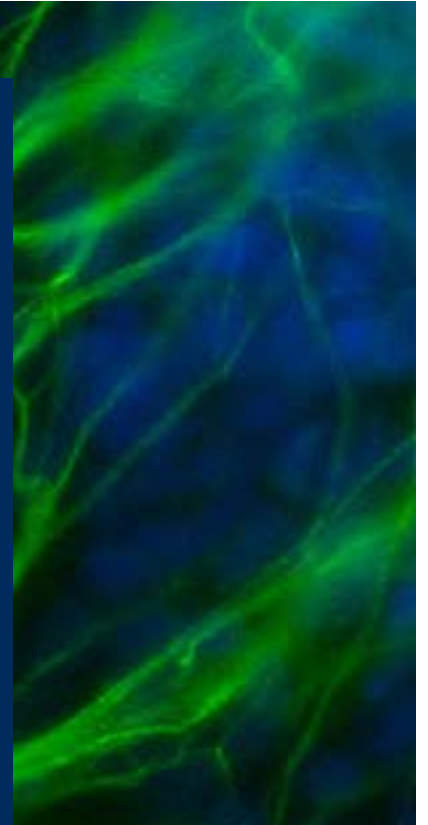
High Macro Affirmation

High Micro Affirmation



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How do environments that foster  
social integration and inclusion  
result in greater persistence?



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# Biology Scholars Program (BSP) UC Berkeley



- 23 year program
- Consistent “beating the odds” results
- Provides academic advising, social support, research opportunities, mentorship, seminars and workshops, community.
- National recognition for its success



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## Gift It Forward Study

- 73.1% Female
- 26.6% Male
- .3% Other
  
- 41 % Hispanic
- 29.5% Asian
- 10.6 % African America
- 7.6% White European
- <1% Native American/Alaskan
- 11% Other/Unknown



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Gift It Forward Study

## Three Year Response Rates

	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017
Cohort 1 (N= 69)	100%	86%	90%	80%	67%	63%	Grad
Cohort 2 (N=36)		92%	86%	92%	78%	50%	73%
Cohort 3 (N=59)			100%	86%	83%	86%	74%
Cohort 4 (N=53)				87%	85%	85%	73%
Cohort 5 (N=86)					93%	84%	85%
Cohort 6 (N=17)						94%	88%



*Building on Kelman's social influence theory....*

## Who integrates into the scientific community?

### Tripartite Integration Model of Social Influence (TIMSI)

Scientific self-efficacy

- I can do what scientists do

Scientific identity

- I am a scientist

Internalization of scientific values

- I agree with the values of the scientific community.

+



+

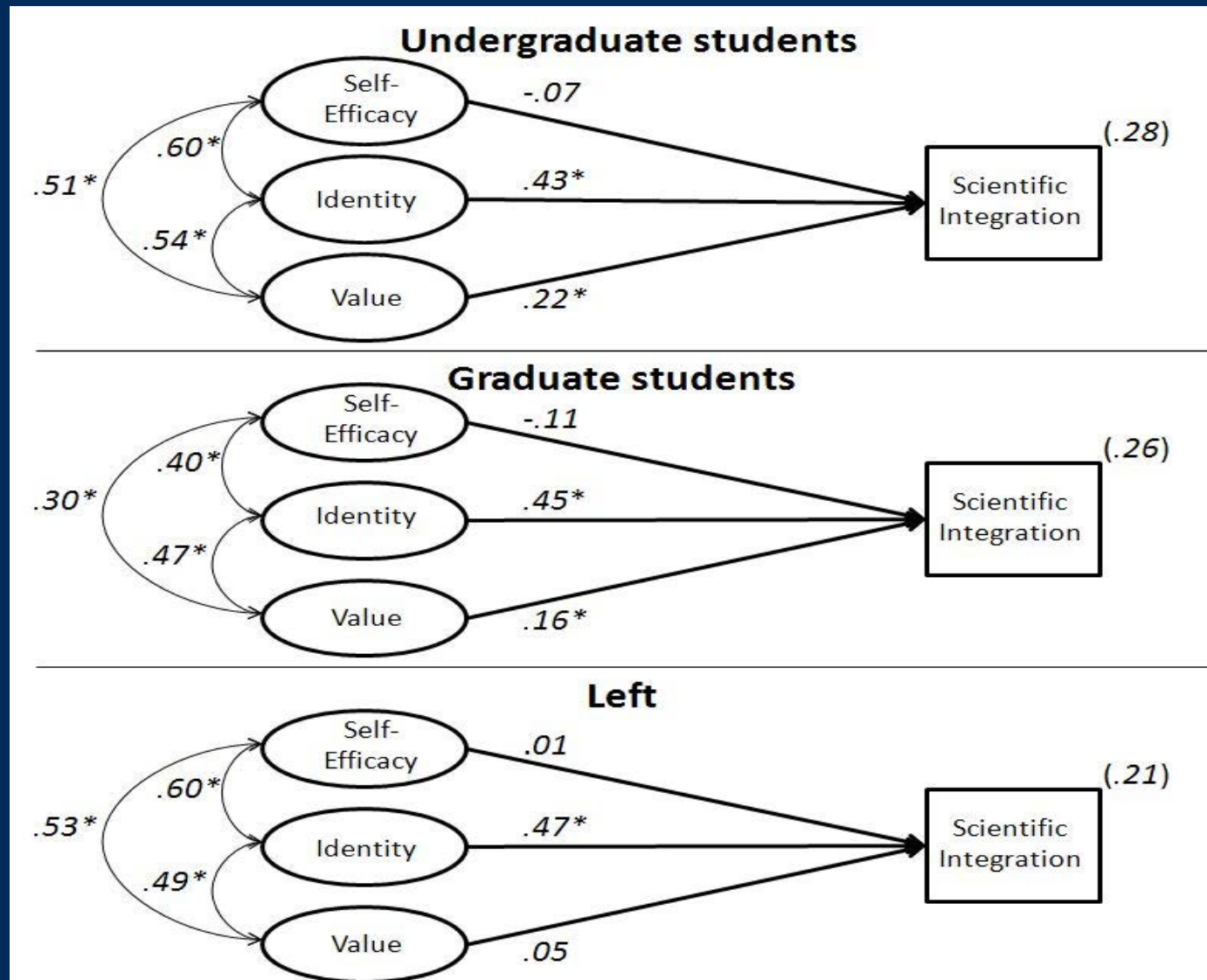


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Integration  
(persistence)

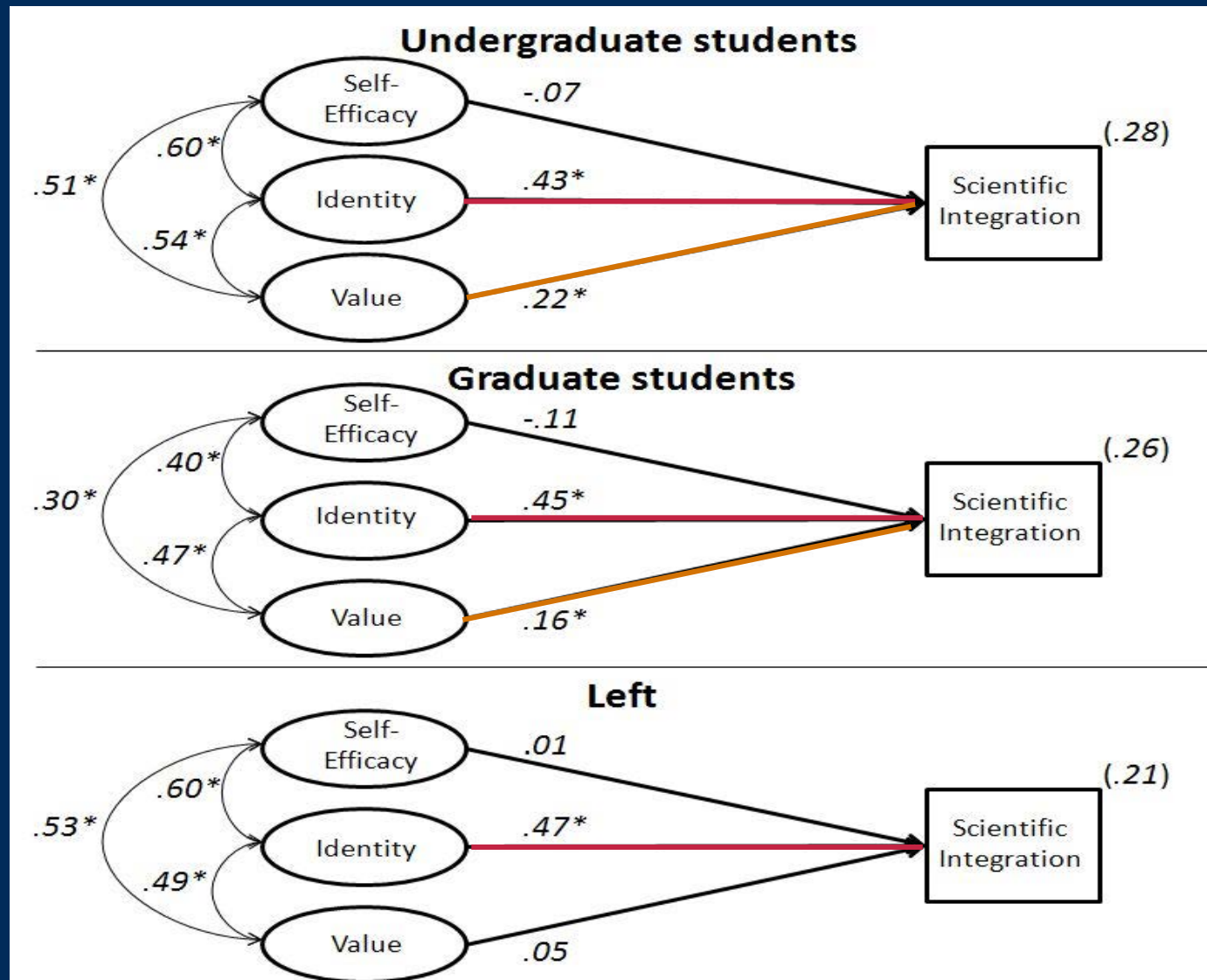
# Tripartite Integration Model of Social Influence (TIMSI)



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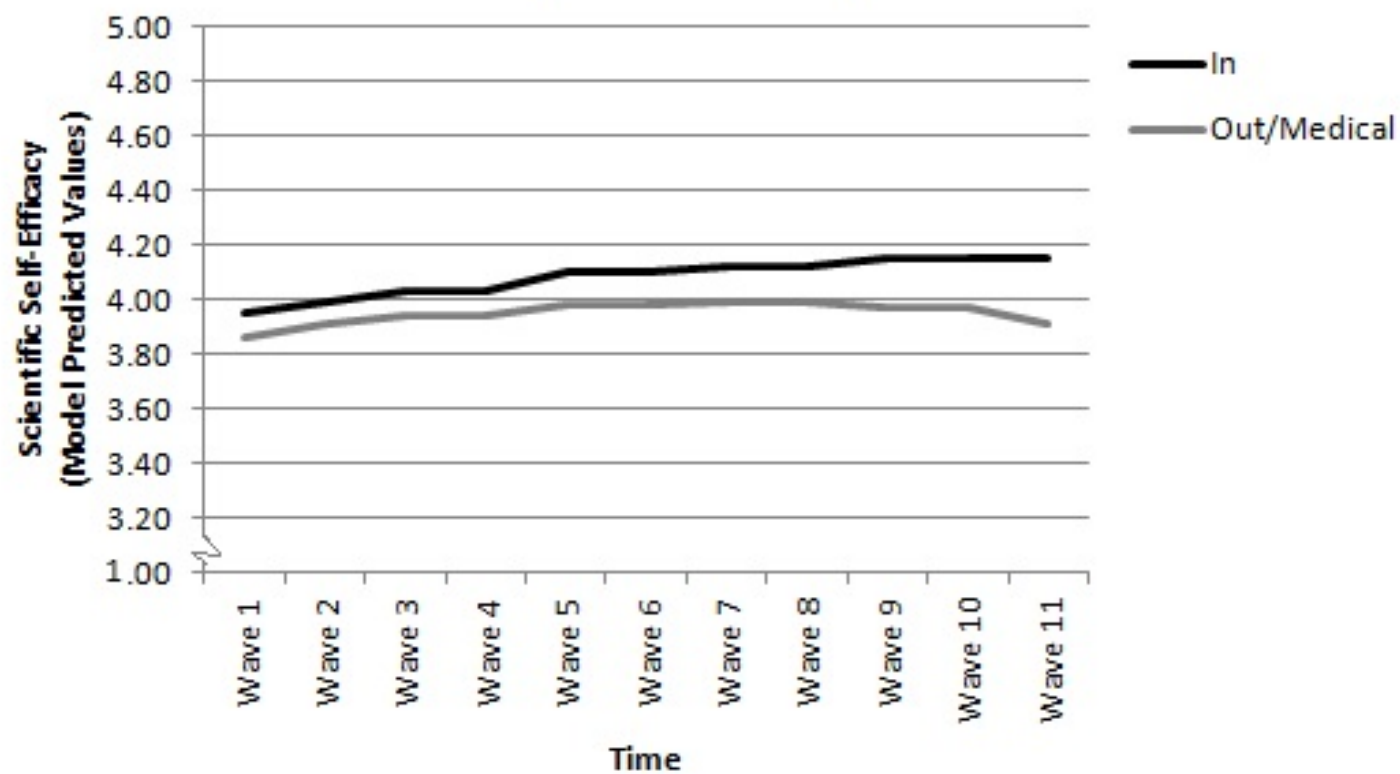


# Tripartite Integration Model of Social Influence (TIMSI)



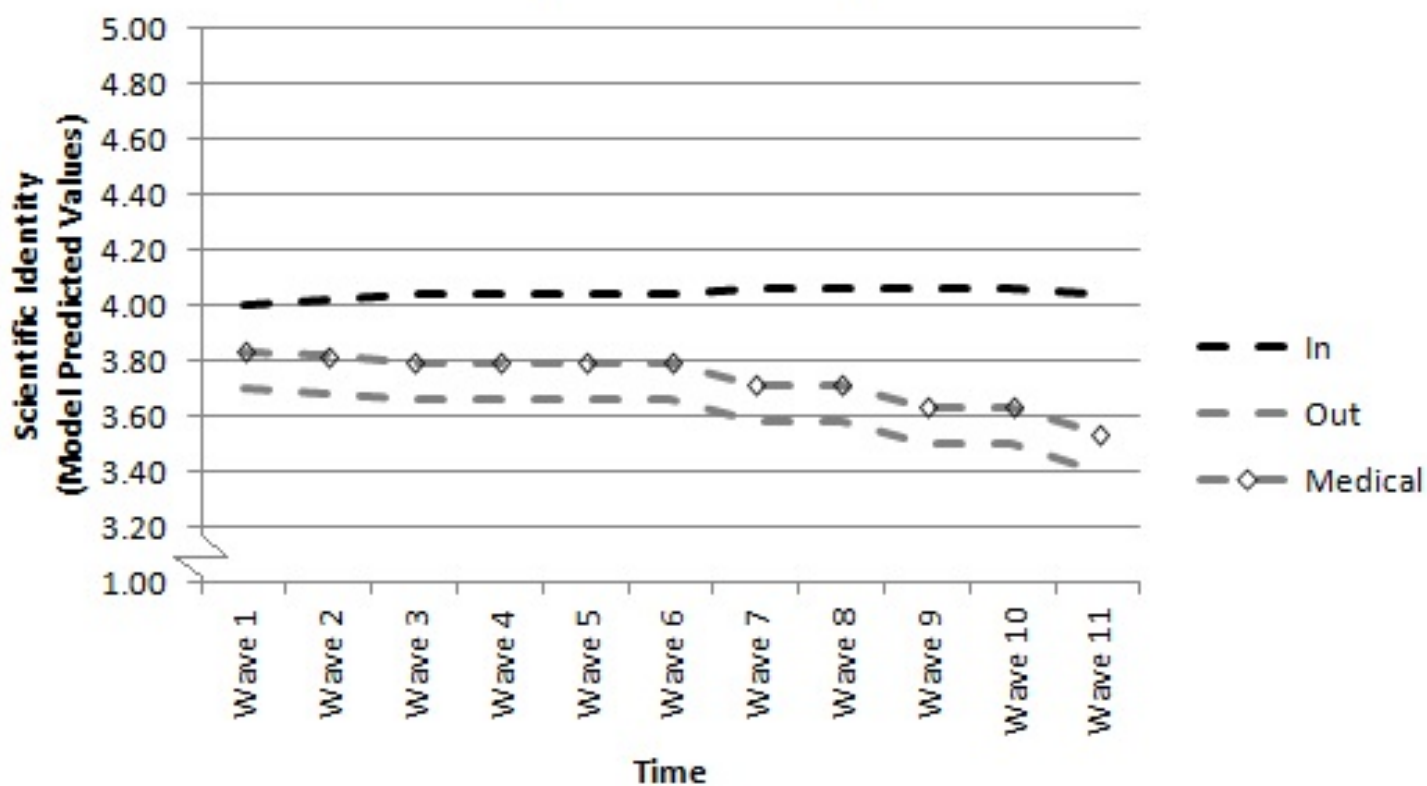


## Scientific Self-Efficacy (Over Time)



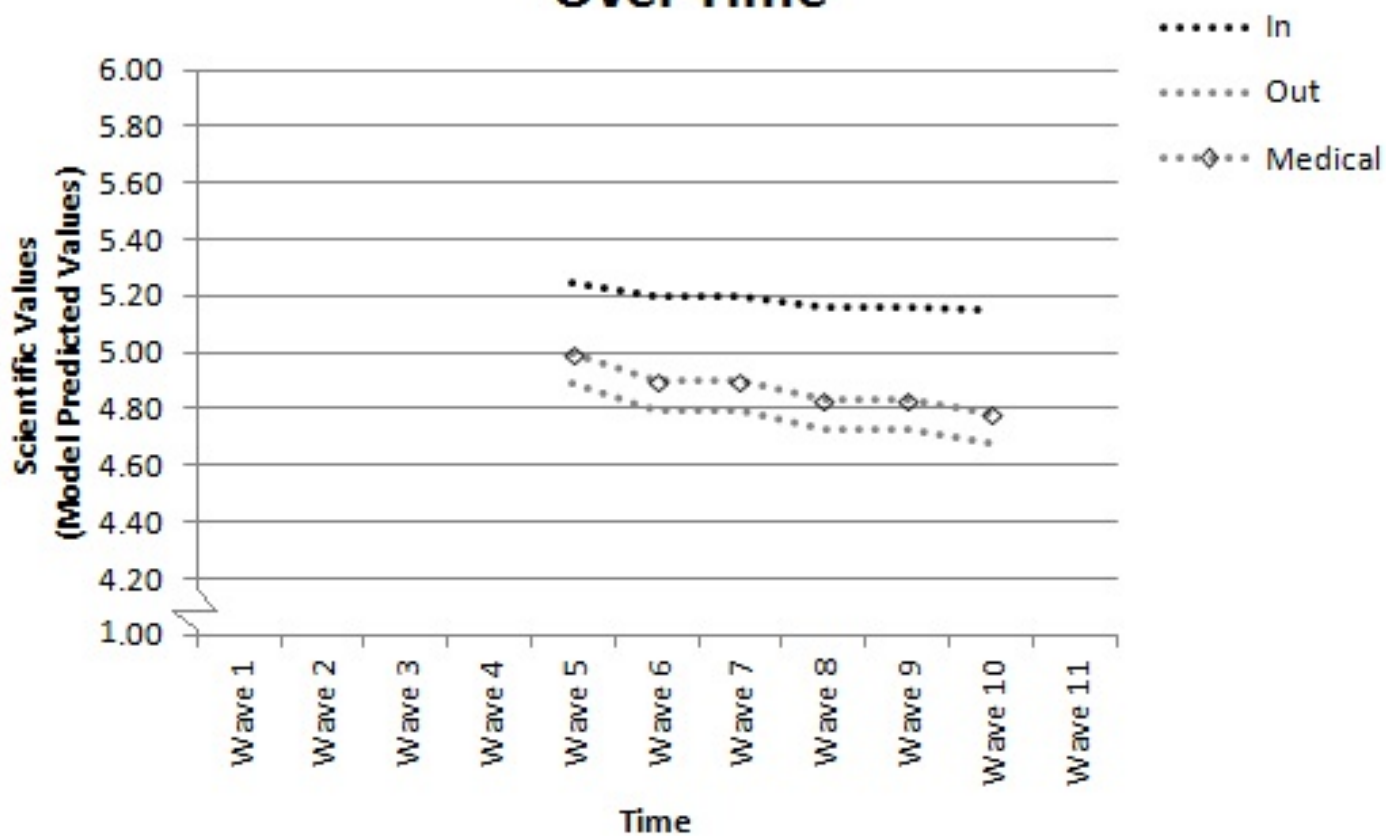


## Scientific Identity (Over Time)





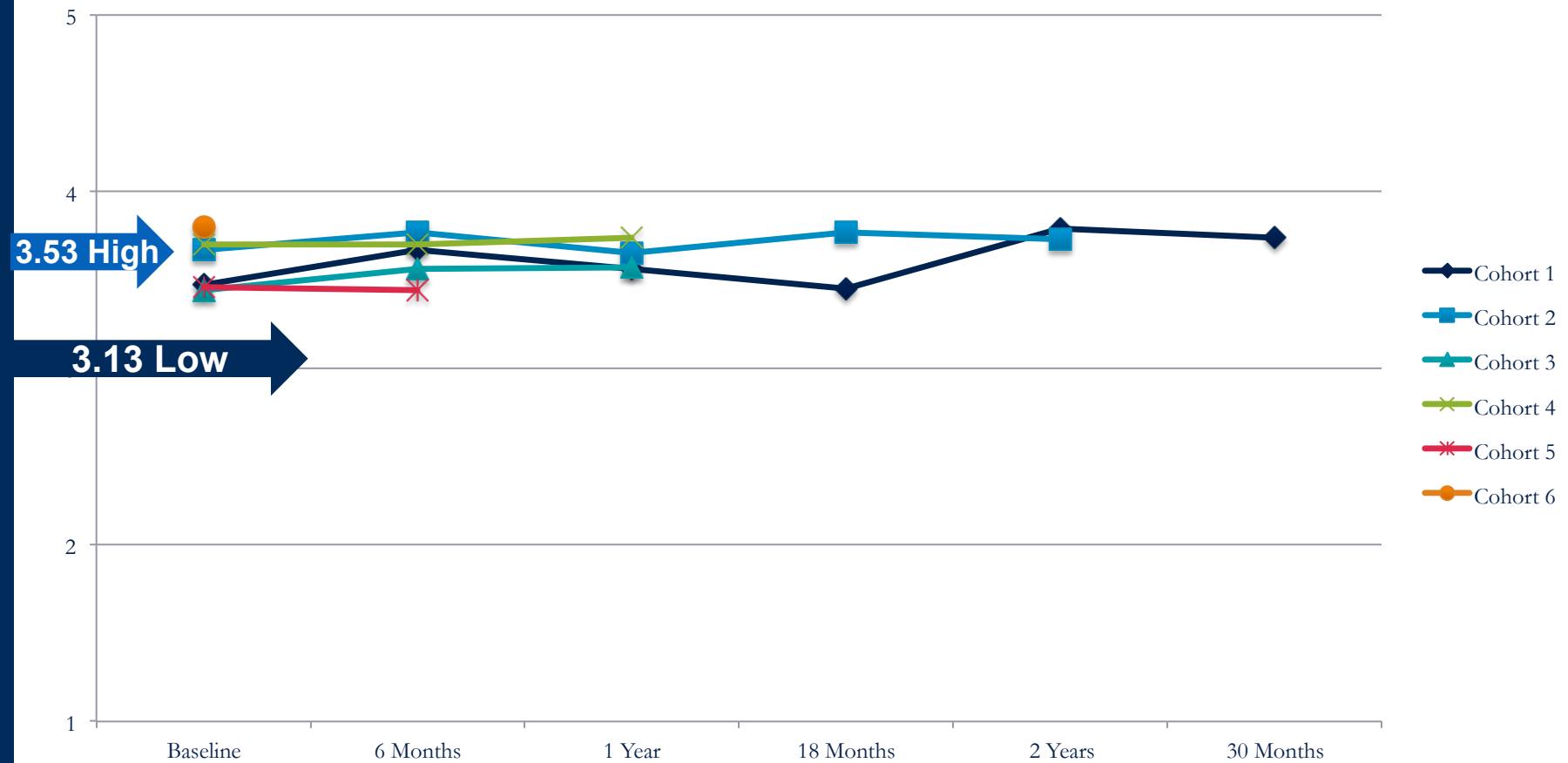
## Value the Objectives of Science Over Time



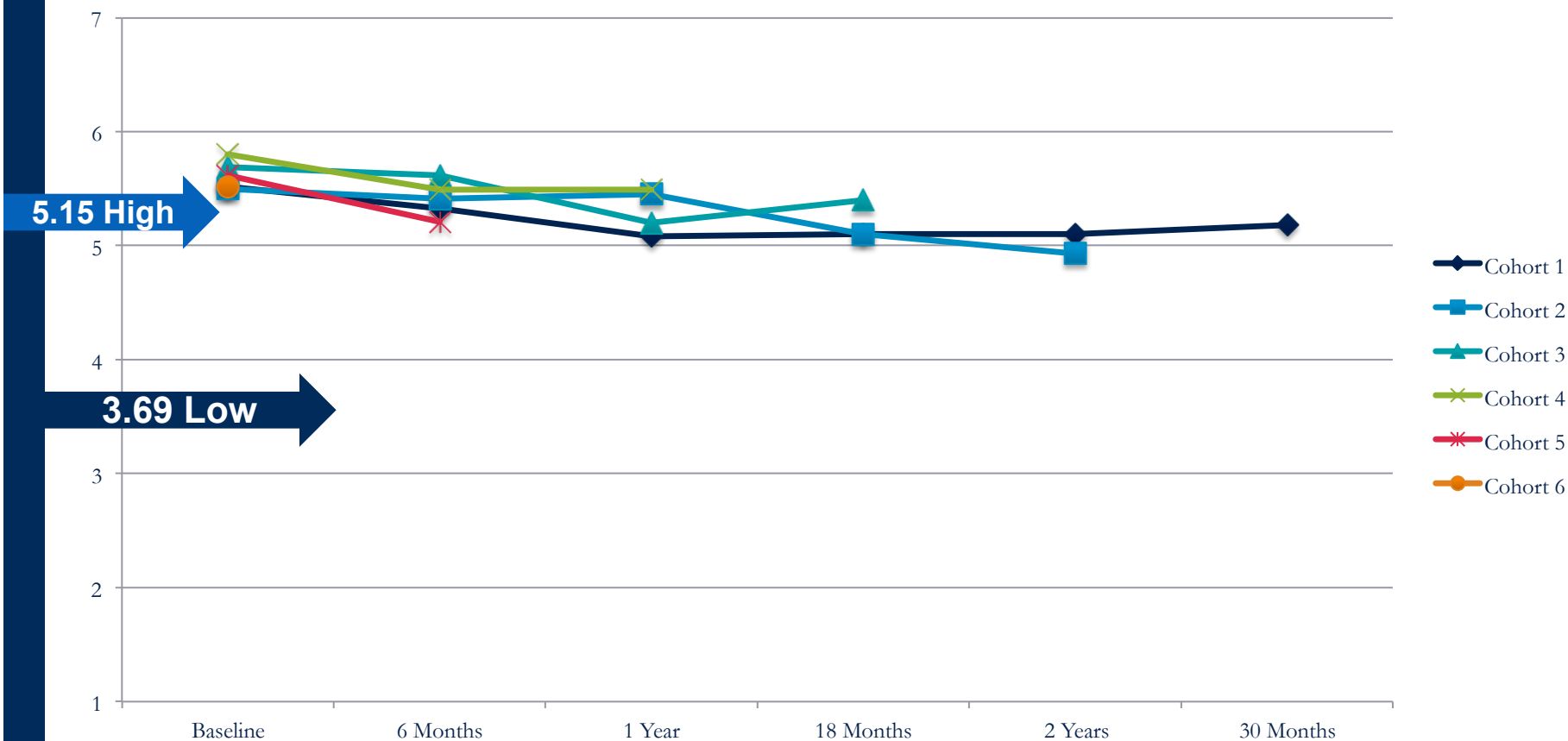


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## *Scientific Self-Efficacy*



*No significant declines for BSP students.*



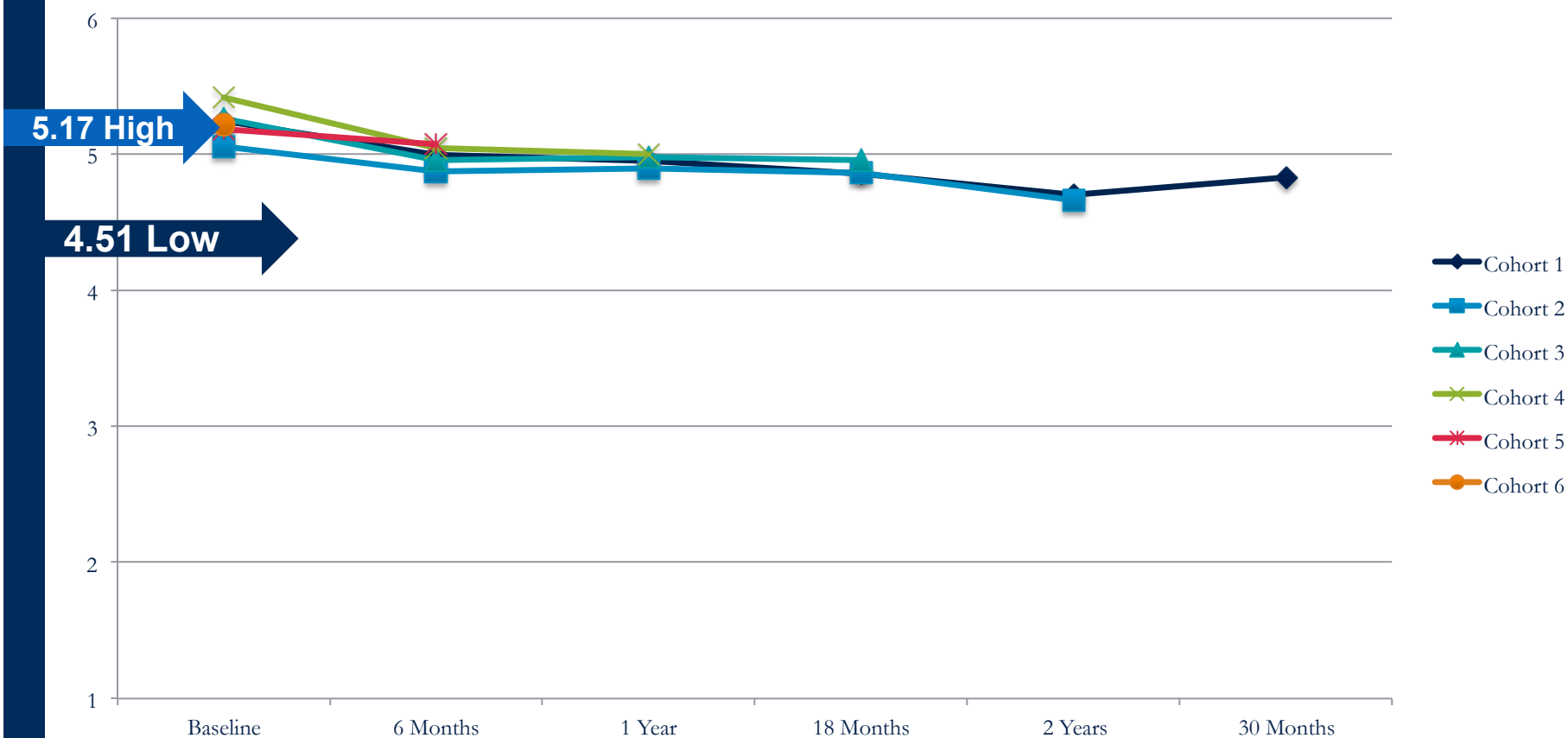
*Significant decline for cohort 4 from Baseline to 1 Year.*





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## *Scientific Community Values*

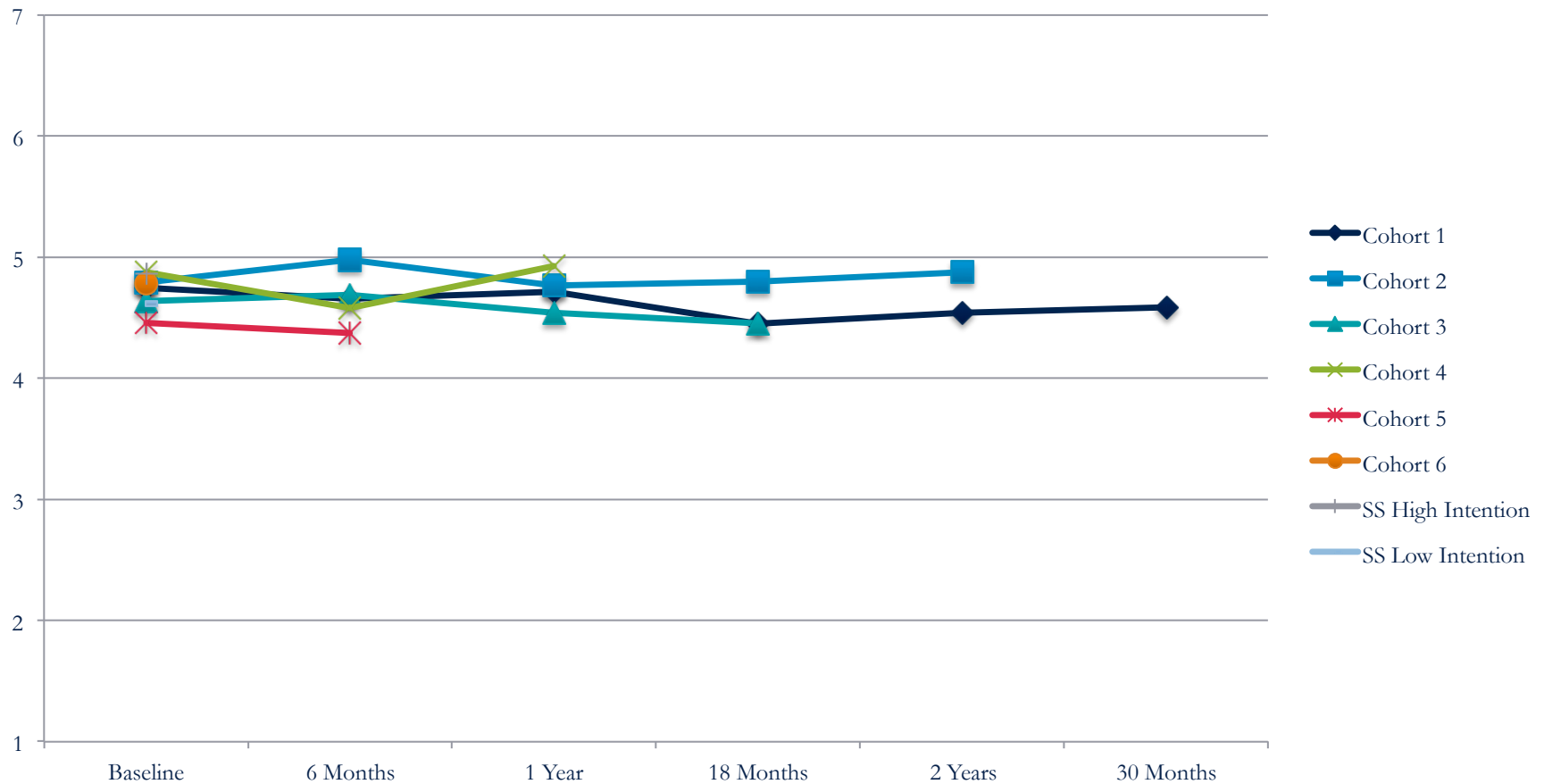


*Significant declines cohort 1 from Baseline to 18 months.*



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# *Satisfaction and Well Being*



*No significant declines for BSP students.*



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## Biology Scholars: *Stress*



*Cohort 2 stress levels rose significantly from 1 Year to 18 Months.*



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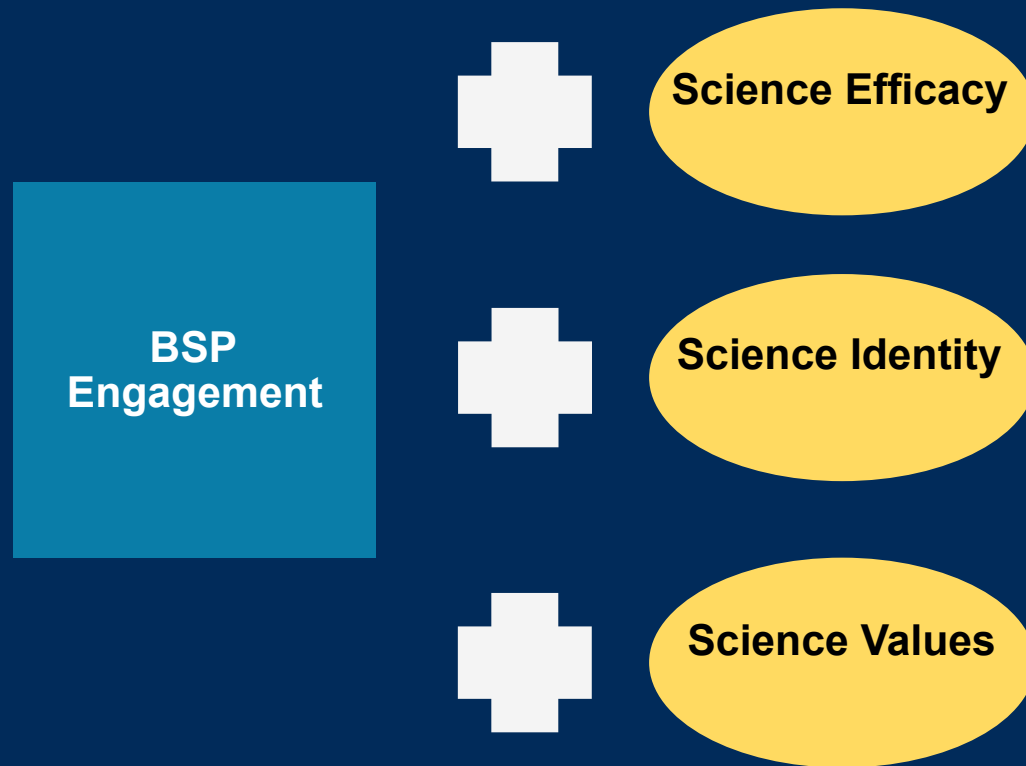
Estrada, M., Eroy-Reveles, A., & Matsui, J. (under review). The influence of affirming kindness and community on broadening participation in STEM career pathways. *Social Issues Policy Review*.

# BSP Engagement (self-reported)



- How much would you miss the BSP faculty and staff if you were not able to spend time or communicate with them?
- How close are you (in personal and emotional terms) to the members of the BSP faculty and staff?
- How important are the BSP faculty members to you?
- How do you think the BSP faculty and staff rate you as a student?
- How do you think the other BSP students rate you as a student?
- How much would you miss the other BSP students if you were not able to spend time or communicate with them?
- How close are you (in personal and emotional terms) to the other BSP students?
- How important are the other BSP students to you?

# Interesting Findings...



At each time point, BSP self-reported engagement was significantly correlated with science efficacy, identity, and values.

**TRANSLATION:** When people feel engaged and connected with BSP staff and students, they also seem to be experiencing integration into the science community.

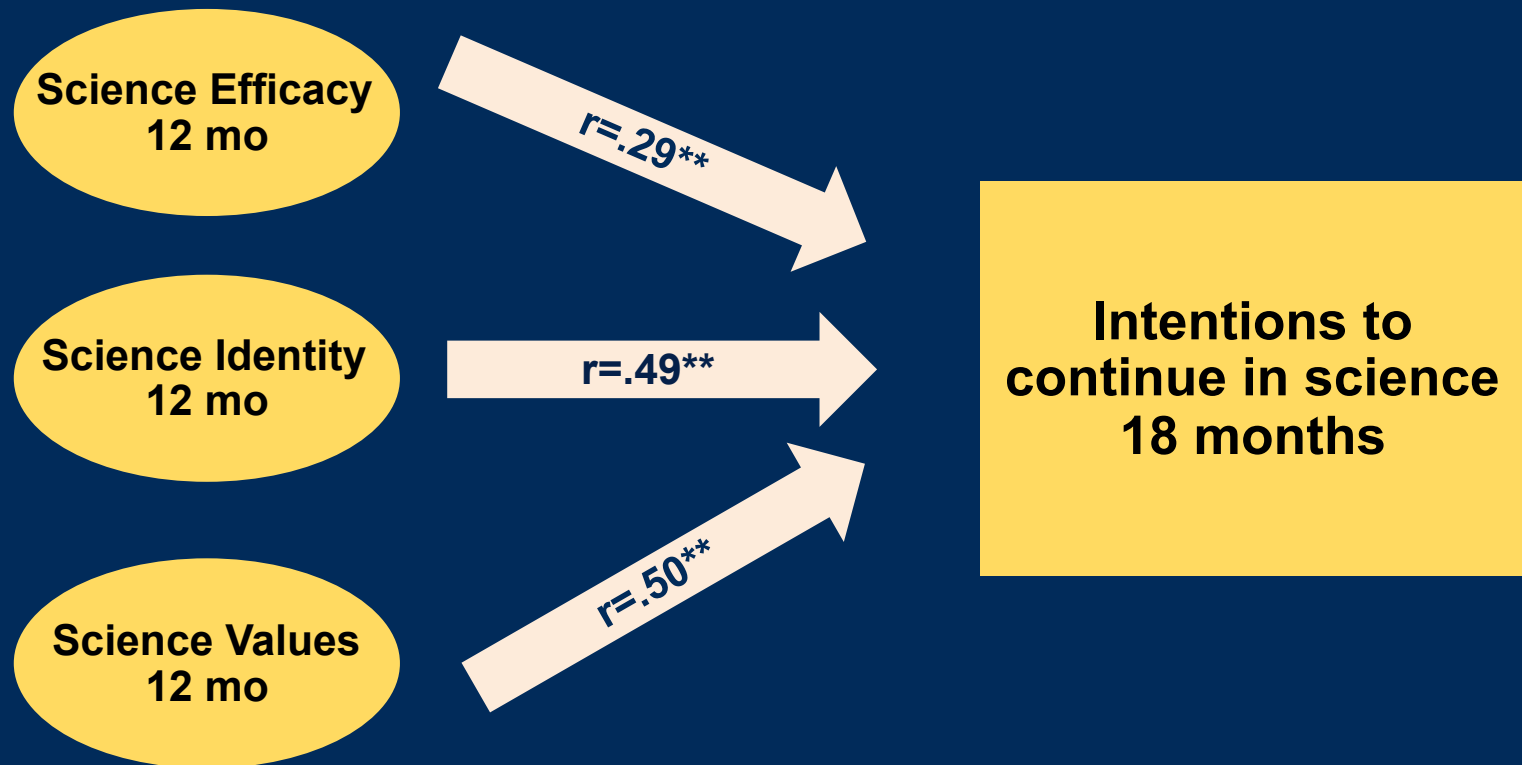
# More Interesting Findings...

- Science efficacy, identity and values at 1 year all significantly predicted intentions to persist in science at 18 months.
- Simultaneous regression show that only science identity and values (at 12 months) uniquely predicted intentions at 18 months.

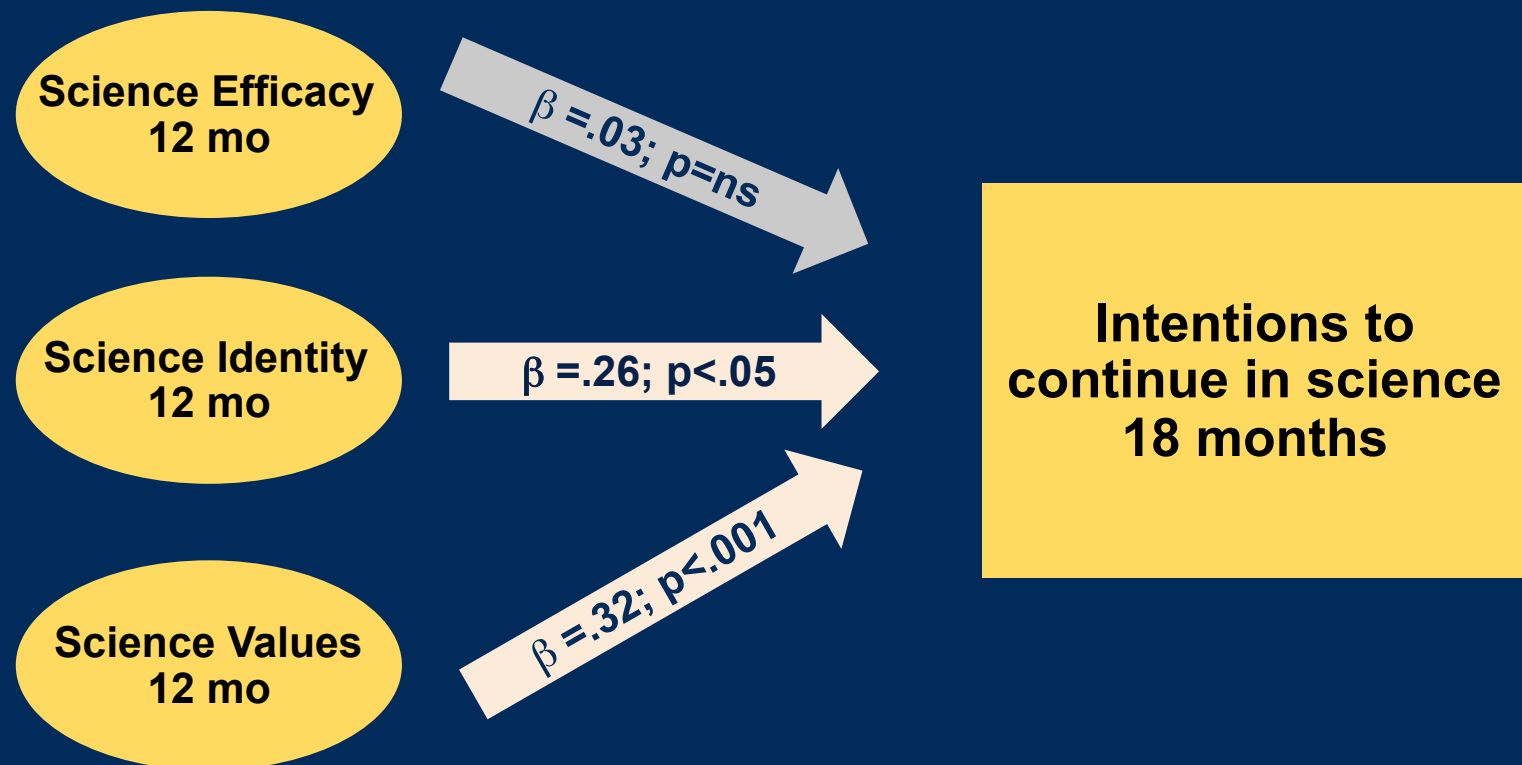




# Correlation Analysis



# Regression Analysis



# Social Climate

**These questions are related to your experience with the people you know in the scientific community at UC Berkeley. People in the scientific community can include anyone you know who works in the sciences either in a university setting (faculty members, researchers, or people who work in science laboratories) (0 disagree – 7 agree).**

- I feel that the scientific community provides me with choices and options.
- I feel understood by people in the scientific community.
- People in the scientific community convey confidence in my ability to do well.
- People in the scientific community encourage me to ask questions.
- People in the scientific community listen to how I would like to do things.
- People in the scientific community try to understand how I see things before suggesting a new way to do things.
- People in the scientific community understand people like me.



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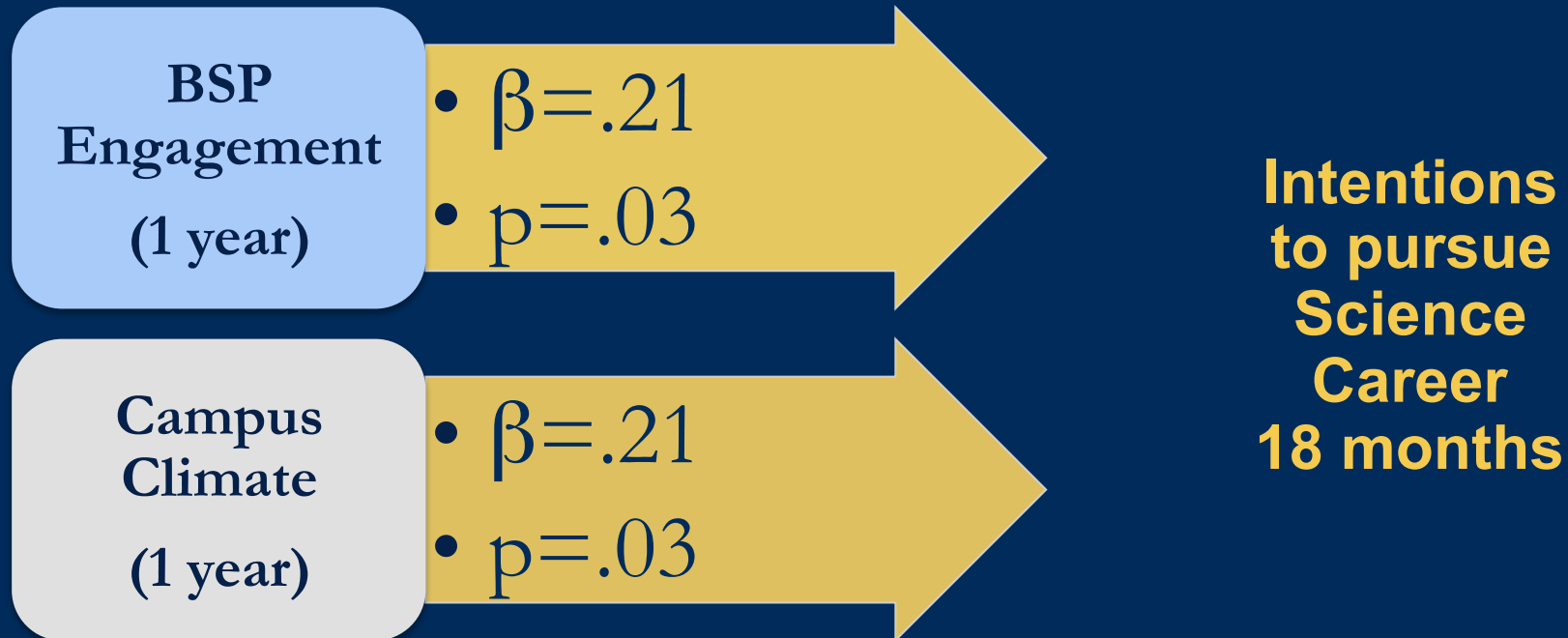
## *BSP Engagement and Climate*

<b>BSP Engagement</b>	Climate Baseline	Climate 6 mo	Climate 12mo	Climate 18 mo
Baseline	.26**	.23**	.07	.04
6 months	.17*	.29**	.14	.18
12 months	.20**	.11	.23**	.26**
18 months	.09	.27**	.25**	.32**
24 months	.35**	.36**	.31*	.44**

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

# Regression analysis



$R = .34$  (variance accounted for)



# In Summary....

- Effective Programs help sustain student integration into professional community
- Integration into the scientific community predicts greater intentions to stay in sciences
- BSP engagement is related to general ratings of the scientific community social climate, but uniquely contributes to intentions to persist.

*The learning social environment matters to historically underrepresented student persistence. We can learn from effective programs in order to infuse larger institutions with these attributes.*

# Improving Underrepresented Minority Student Persistence in STEM

**Mica Estrada,<sup>1\*</sup> Myra Burnett,<sup>2</sup> Andrew G. Campbell,<sup>3</sup> Patricia B. Campbell,<sup>4</sup> Wilfred F. Denetclaw,<sup>5</sup> Carlos G. Gutiérrez,<sup>6</sup> Sylvia Hurtado,<sup>7</sup> Gilbert H. John,<sup>8</sup> John Matsui,<sup>9</sup> Richard McGee,<sup>10</sup> Camellia Moses Okpodu,<sup>11</sup> T. Joan Robinson,<sup>12</sup> Michael F. Summers,<sup>13, 14</sup> Maggie Werner-Washburne,<sup>15</sup> and MariaElena Zavala<sup>16</sup>**



Increasing Institutional Accountability (using data!)

Create strategic partnerships with programs that create lift (e.g. BSP)

Unleash the power of the curriculum (e.g. CURES/FRI/ETC)

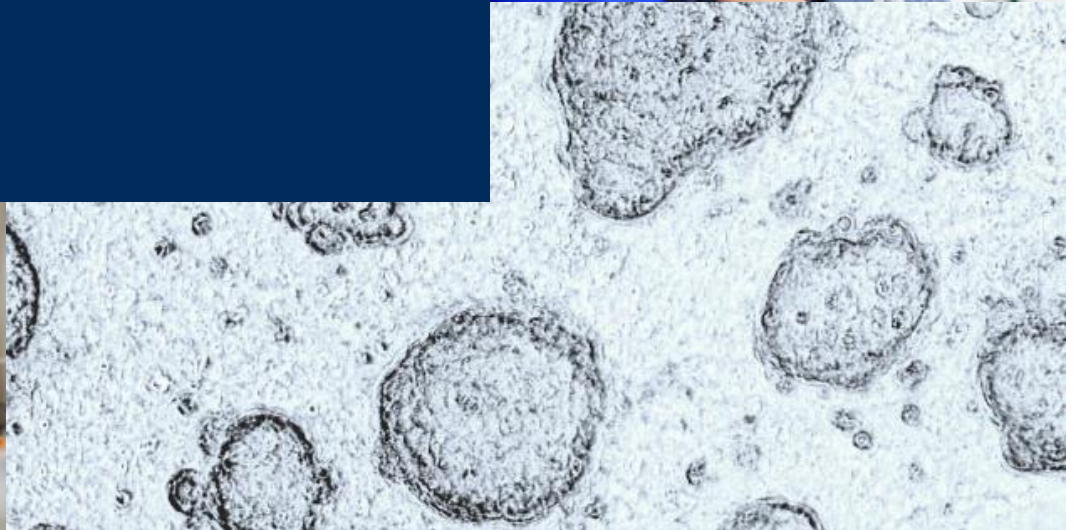
Address student resource disparities

Fire the creative juices





THANK YOU  
UCSF



# Example of Science Efficacy Questions

Extent to which you are confident you can successfully complete the following tasks...

- Use scientific language and terminology.
- Figure out/analyze what data/observations mean.
- Use scientific literature and/or reports to guide research.
- Use technical science skills (use of tools, instruments, and/or techniques).
- Report research results in a written paper.



# Example of Science Identity Questions

Level of agreement with each statement...

- In general, being a scientist is an important part of my self-image.
- I am a scientist.
- I have a strong sense of belonging to the community of scientists.
- Being a scientist is an important reflection of who I am.



Estrada et al., 2011 modified from Chemers, et. al. (2010).

# Example of Science Value Questions

How much is this person like you?



- A person who thinks it is valuable to conduct research that builds the world's scientific knowledge.
- A person who believes writing up research results to be published in a leading scientific journal is a good use of time.
- A person who feels discovering something new in the sciences is thrilling.
- A person who thinks it is important work to identify truths using the scientific method.
- A person who thinks discussing new theories and ideas between scientists is important.