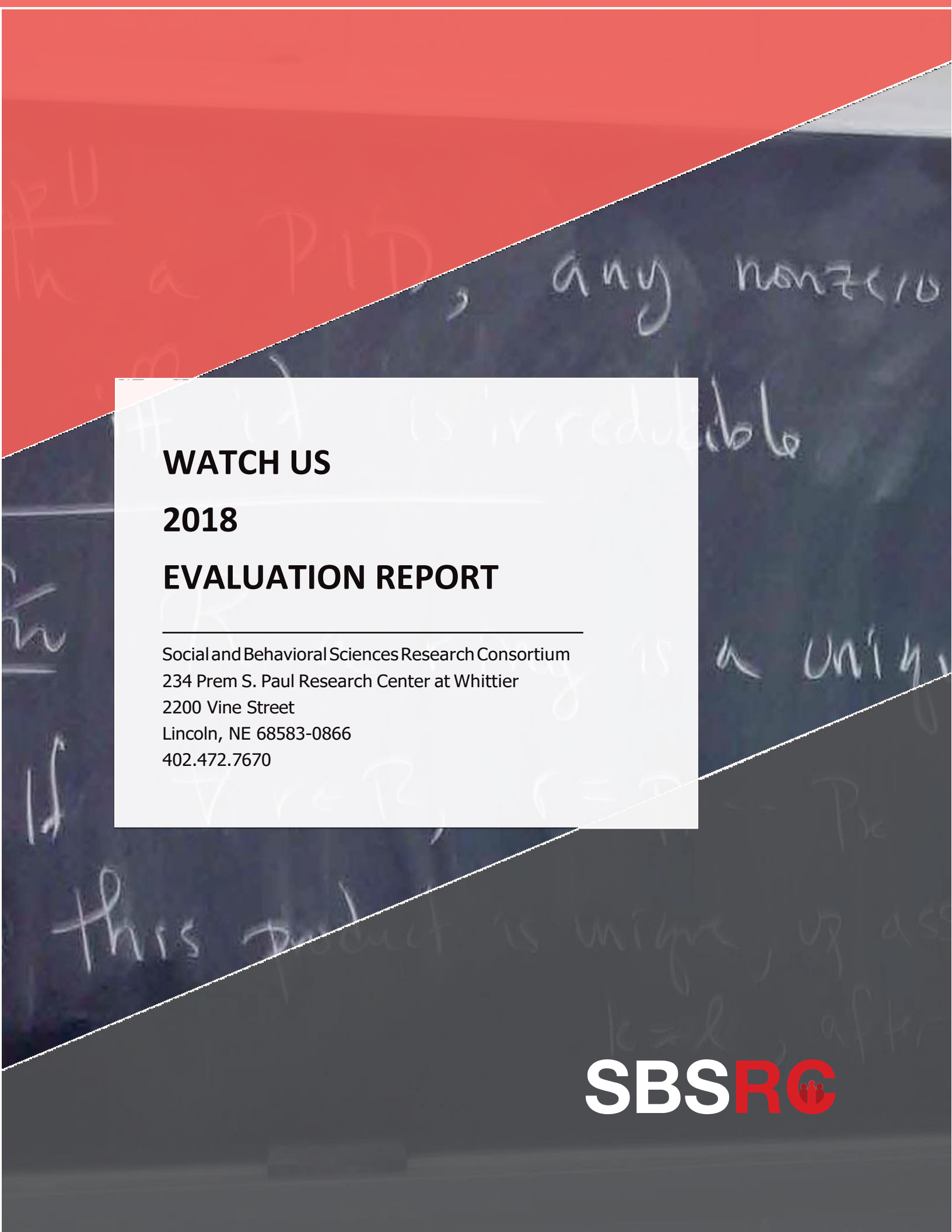

WATCH US

2018

EVALUATION REPORT

Social and Behavioral Sciences Research Consortium
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SBSRC

NSF INCLUDES WATCH US
Evaluation Report
September 2018

This report was prepared for the NSF INCLUDES WATCH US PI team: Ruth Haas, Deanna Haunspauger, Ami Radunskaya and Judy Walker.

If you have any questions or concerns regarding the information reported within, please contact us at: Methodology & Evaluation Research Core Facility, Social and Behavioral Sciences Research Consortium, University of Nebraska – Lincoln, 370 Prem S. Paul Research Center at Whittier School, 2200 Vine Street Lincoln, NE 68583-0866, 402-472-7670, merc@unl.edu, merc.unl.edu

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Prepared by:
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Table of Contents

Introduction 5
Administrative Structure 5
Leadership Team 5
Grant Activities 6
Social Science Research 6
Year 1 6
Program Participant Research 6
WATCH US Stakeholder Meeting 7
Year 2 7
Prototype Projects 7
Prototype Project Participant Surveys 8
Prototype Projects Grantee Experiences 9
Stakeholder Interviews 10
Sample Design 10
Sample Recruitment 10
Data Collection Process 10
Qualitative Data Analysis 10
Results 11
WomenDoMath.org Website 12
Development 12
Content 12
User Statistics 13
Collective Impact 14
Methods 14
Results 14
Vision 14
Network/Partnerships 19
Goals/Metrics 25
Communication/Leadership 25
Conclusion 29
Appendix A: Prototype RFP 32
Appendix B: Prototype Survey Instruments 36
Pre-Test Survey 36
Pre/Post Survey 46

Post-Survey.....60
Post Only Survey.....81
Appendix C: Stakeholder Interview Questionnaire.....103

Introduction

In order to assess the formative process and outcomes of the INCLUDES WATCH US Design and Development Launch Pilot project, the evaluation team utilized a team approach of a social science researcher (Trish Wonch Hill) and an external evaluator (Mindy Anderson-Knott). Anderson-Knott and Wonch Hill worked collaboratively on the project's data collection design, instrument development, and analysis to ensure valid and reliable data was collected and analyzed appropriately. This evaluation report summarizes progress on activities completed in the project, as well as a summary of the collective impact of the project.

Administrative Structure

Leadership Team

The leadership team consisted of four principal investigators, one social scientist senior personnel, and the external evaluator. Team members included:

- PI, Ruth Haas, Smith College, Smith Post-Baccalaureate Program
- PI, Deanna Haunsperger, Carleton College, Carleton SMP (Summer Mathematics Program)
- PI, Ami Radunskaya, Pomona College, EDGE: Enhancing Diversity in Graduate Education
- PI, Judy Walker, University of Nebraska, NCUWM: Nebraska Conference for Undergraduate Women in Mathematics
- Sr. Pers., Trish Wonch Hill, University of Nebraska, Department of Sociology
- External Evaluator, Mindy Anderson-Knott, University of Nebraska, Social and Behavioral Sciences Research Consortium

The leadership team met several times over the two years of the grant period. In the first year, the team met almost monthly to discuss the implementation of the project. In the second year, meetings continued on a regular basis, meeting approximately every other month. Meetings were primarily conducted via zoom video conferencing or phone due to the national collaboration, although in person meetings occurred in October 2016 during the GROW Summit and in June 2017 during the stakeholder meeting. In addition to these meetings, several members of the team were able to meet in person at national meetings including Mathfest and the Nebraska Conference of Undergraduate Women in Mathematics (NCUWM). For the vast majority of meetings, all Investigators, senior personnel and evaluation participated in the meeting. The team showed excellent communication and an equitable division of labor, with equal input from team members, active participation and communication between meetings via email and phone as needed.

WATCH US National Advisory Board

The WATCH US national advisory board was formed to advise the team on project goals and objectives. The team met via Zoom videoconferencing in November 2016 to discuss the scope and intention of the project. The board advised the team on the sample creation, study design and project goals, which resulted in modifications to the design. Table 1 has a list of the WATCH US national advisory board members:

Table 1. National Advisory Board Members and Organizations

Hélène Barcelo	Mathematical Sciences Research Institute
Edray Goins	National Association of Mathematicians
Helen Grundman	American Mathematical Society
Brit Kirwin	Conference Board of the Mathematical Sciences
Rachel Levy	Society for Industrial and Applied Mathematics
Dusa McDuff	Institute for Advanced Study
Francis Su	Mathematical Association of America
Jessica Utts	American Statistical Association
Cristina Villalobos	Society for Advancement of Chicanos/Hispanics and Native Americans in Science
Talitha Washington	Association for Women in Mathematics

Grant Activities

Social Science Research

Social science research activities account for a major portion of this grant. Senior Personnel, Trish Wonch Hill leads these efforts with collaboration from the program evaluator Mindy Anderson-Knott and the WATCH US WATCH US PI Team who are all involved considerably in research design, interview protocols, sample selection and interpreting results. In year 1 of the grant, participants of six programs aimed at increasing the number of women in the mathematical sciences were surveyed (N=198) and interviewed (N=55). Results of this study were shared at the WATCH US Stakeholder meeting in June 2017. Currently results of this research is in a manuscript that will be submitted for review in the Fall of 2018. In year 2 of the grant, the social science research included the following research activities occurred; Prototype Project Participant Surveys, Stakeholder Interviews, Collective Impact Survey.

Year 1

Program Participant Research

Although 30 participant interviews were estimated in the proposal, the PI team made the decision to include 10 participants from each of the four originally targeted programs. Moreover, two programs were added to the research through collaborative processes and from suggestions from the WATCH US national advisory board, which ultimately resulted in 55 interviews being completed across the six programs. The Bureau of Sociological Research at the University of Nebraska – Lincoln completed the interviews in January through April 2017.

Incorporating input from the PI's and the external evaluator, the interview protocol was developed by Trish Wonch Hill in order to assess a variety of paths to an advanced degree in mathematics (MS or PhD). In addition, it was important to the team to assure language was value free in order to recognize and validate all desired potential outcomes and career paths for program participants.

Although not originally proposed in the grant, an internet survey of 198 program participants

was also collected in order to assess quantitative outcomes for a larger sample. Although the interviews were collected using a quota to include participants from different racial/ethnic groups, and with different outcomes, the quantitative survey was administered as a census to the whole sampling frame.

Broadly, the 55 interviews and 198 internet surveys provide evidence that programs work in both social and psychological ways to buffer negative experiences and thus recruit and retain women into advanced degrees in mathematics. A sociological perspective allows us to assess individual respondents' outcomes embedded within the context of interactional, institutional and cultural formal and informal systems. Many respondents found barriers to completing advanced degrees in mathematics, including social isolation, and individual and systemic discrimination. Programs targeted towards historically underrepresented minorities in mathematics provided a social and psychological buffer to these barriers. Respondents indicated that, particularly for the longer duration and more intensive programs that they had gained a social support system and sense of belonging within a community that they would not otherwise have as a gender and/or race ethnic minority in their home institutions. Although many gained confidence in their mathematical capabilities via the content and course work they encountered, access to a broader mentor and peer network allowed them to more effectively navigate the institutional barriers they encountered in undergraduate and graduate institutions. Most importantly, finding a community and a sense of belonging were key in their persistence towards an advanced degree in mathematics. Until women and persons of color are no longer the minority in their departments, programs that provide these informal and formal professional supports are effective in recruiting and retaining underrepresented minorities in mathematics.

WATCH US Stakeholder Meeting

The 2017 WATCH US Stakeholder meeting was hosted in Lincoln, Nebraska on June 8-10. PI Judy Walker led the efforts, with active input from the other PI's, to identify key stakeholders to invite to the meeting. It was particularly important to the team that national associations, and leading PhD granting institutions within mathematics, statistics, and industry were represented, as well as stakeholders from smaller liberal arts colleges. Although 60 participants were budgeted, final attendance was 43. The agenda included orienting participants to the project, a half-day presentation of the social science research associated with this project, and numerous opportunities for small and large group discussions.

Year 2

Prototype Projects

Twenty-one prototype projects were awarded in the Fall of 2017. The deadline for submission for these awards was September 15, 2017 (See Appendix A for the RFP). The RFP was disseminated to all stakeholders who attended the stakeholder meeting, through the WATCH US website, WomenDoMath.org, on listservs for organizations that Project PI's have leadership responsibilities in, and through PI professional networks via email. The WATCH US team

received 41 applications. All PI's reviewed the applications between September 15 and October 1, 2017, and funding decisions were decided collectively based on requirements outlined in the RFP and overall merit. Altogether, 21 projects were funded for a total of $64,803. Funding amounts ranged from $2,000 to $4,875; the average awarded amount was $3,085.

The types of programming funded were broad across the 21 prototype projects, with all focused in one way or another on increasing the number of women with advanced degrees in the mathematical sciences. Programs invited external speakers for talks, funded innovative pedagogy in classrooms, or held workshops, retreats or conferences, including the following:

- Mentoring to help participants navigate through critical transition points in their education
- Providing role models who show participants that women like them have made it through the process before
- Increasing confidence by having the participants work on challenging mathematics in a supportive environment
- Building a community of peers who will have their backs and provide support as they progress through graduate programs
- Increasing understanding of the process of graduate school so they know how to apply, thrive, and succeed in graduate school
- Broadening knowledge of mathematics and careers so they have a clearer understanding of their futures

Some of the programs were short term conferences or workshops that lasted from one day to a whole week. One program was a classroom intervention. The rest of the programs funded speakers and panels over the course of an academic semester or academic year. The target audience for these programs were primarily undergraduate and graduate students in the mathematical sciences. Ten programs focused on recruiting undergraduate mathematics majors into graduate school in mathematics, four focused solely on retaining women and minority graduate students in the mathematical sciences, and some were aimed only at retaining graduate students, while the rest (7) provided programming for graduate and undergraduate students, early career faculty, etc. Two programs focused on undergraduate and graduate students in the mathematical sciences interacting with and mentoring high school and middle school age youth.

Prototype Project Participant Surveys

A major goal of this project was to create and pilot an outcomes assessment tool for programs aimed at increasing the number of women and race/ethnic minorities in the mathematical sciences. The online assessment tool was developed by Senior Personnel with input incorporating results from the qualitative/quantitative studies of past program participants conducted in year 1, and with input and iterative feedback from all four program PI's and the project evaluator. Survey design was conducted during the Fall of 2018, but the survey was not yet ready for some programs to utilize prior to their program start date, particularly if they started or held their program prior to January 15, 2018. Additionally, although some programs had participants sign up in advance to participate in programming which facilitated email

delivery of a pre-survey prior to the event, other programs simply advertised their events broadly, and only collected participant information after the event was over in some cases, or after the first of a series of program events. Because of this, three different survey were created to gather data from programs of different duration, and depending on whether the prototype PI collected sign up information prior to the start of program activities. For those whose program had already begun prior to survey development but whose programming had not yet finished (#), or for those programs who did not have participants sign up to participate in advance but who had ongoing programming over a series of weeks or months, they received a Retrospective Pre/Post Survey as soon as the survey was finalized, and Post-Survey when the program was over. For those who did not have a sign up list or whose entire event was over before a Retrospective Pre/Post Survey could be administered, they received a Follow-up only survey. Every other program had a Pre-Survey prior to the event, and Post-Survey following the event. You will find the Pre-Survey, the Retrospective Pre/Post Survey, the Post Survey, and the Post-only surveys in Appendix B. Data collection from all surveys was finished in September, 2018, and data cleaning, analysis and reporting will take place in the no-cost extension year.

Prototype Projects Grantee Experiences

Most of the prototype award recipients applied for the funding to pilot a program, with all (100%) of the 14 participants who completed the survey implementing the programming for the first time with this award. As of June 2018, half (50%) completed their programming, with the rest either still conducting their programming or their programming is scheduled for a future date. Of the seven participants answering the survey question about how rewarding the experience was with implementing the program, all (100%) reported the experience as very rewarding. When asked how, if at all, they believe the program has made or will make a difference in broadening participation of women and/or others who belong to historically underrepresented groups in mathematics, the most commonly reported answer was connecting of women in mathematics and building that network, with five of the thirteen responding to this question referencing this. The vast majority (79%) of the 14 participants who completed the survey reported being very likely to implement the program again, with the remaining 21% being somewhat likely. Most (77%) believe that there are ways that they could sustain some of their programmatic activities in the future without the mini-grant funding. The ways in which they would sustain their activities include relying on funding from departments, other institutional funding, applying for external funding, and charging participants.

Stakeholder Interviews

Sample Design

The goal of the stakeholder interviews was to gain insights from a wide variety of stakeholders within the mathematics community to provide a wide range of differing views and opinions on broadening participation in mathematics. The PI's generated a list of stakeholders within the national mathematics community, many of which did not participate in the WATCH US stakeholder meeting in June of 2017. The PI's generated a list of names of key individuals who were believed to hold a variety of opinions on the following:

- The nature and extent of the problem of underrepresentation of women and race/ethnic minorities with advanced degrees in the mathematical sciences.
- The barriers and facilitators to engaging a more diverse population of undergraduate and graduate students in the mathematical sciences.
- The solutions, if any, they may participate in to remedy any perceived problem of underrepresentation of women and race/ethnic minorities in the mathematical sciences.

The team also sought to include individuals with a variety of experiences and roles in the following:

- Their past leadership and participation in programs specifically aimed at increasing the number of women and race/ethnic minorities in the mathematical sciences
- Their leadership positions within varying institutions of higher education, including liberal arts colleges and Research I universities, and leadership or evaluation positions in major professional associations within mathematics or within funding agencies or private industry.

The interview protocol is available in Appendix C.

Sample Recruitment

After some research, there were 32 sample members that had an email address or phone number associated with their name. Sample members were sent email invitations to schedule an interview on March 16, 2018. Two sample members gave the names of three others who they thought should be interviewed; these three were contacted as well. Those who had not responded to the email invitation were sent an email reminder on March 26, 2018 and April 6, 2018.

Data Collection Process

The Bureau of Sociological Research (BOSR) conducted the stakeholder interviews by phone and email. Interviews took up to one hour and were audio recorded. An experienced BOSR interviewer took detailed notes during the interview. Interviews were conducted from March 20, 2018 through May 1, 2018. Seventeen interviews were conducted and two written responses were received, for a total of 19 participants.

Qualitative Data Analysis

Three research assistants organized and independently coded qualitative data for agreement/disagreement or and the extent to which they viewed the underrepresentation of women in mathematics as a problem, and the ways in which it can be solved (positive/optimistic, neutral, negative/pessimistic) by question from interviewer notes. Afterwards, the research team met to discuss and resolve any conflicting codes. Transcription of key findings was conducted to include verbatim quotes in the report. Names of colleges and universities, people and programs were redacted.

Results

Draft results were shared with the leadership team in August 2018. The leadership team is currently reviewing the report and advising on key findings to create an executive summary as well as a plan for dissemination of findings. This will occur during year 3 for the no cost extension.

Planning is currently under way to write a series of short reports to share findings from the stakeholder interviews with key audiences.

WomenDoMath.org Website

Development

Website development to establish a new website, WomenDoMath.org, began in October, 2016. The website is intended as a hub for resources and activities that support women mathematicians at all stages of their careers. PIs Deanna Haunsperger and Ami Radunskaya took the lead on website development. The team decided that, in order for the site to continue beyond the length of NSF funding, it would eventually become part of the website of the Association for Women in Mathematics (AWM). Ann Dixon, a web developer, was hired as a technical consultant to lead the design of the new website built under the WATCH US grant. Ann Dixon is a professional web developer who has worked on the EDGE website since its inception. Sarah Yoseph, a graduate student in mathematics at Claremont Graduate University, was hired to collect content and to implement design ideas. The team received feedback on desired content at the Nebraska Conference for Undergraduate Women in February, and at the WATCH US stakeholder meeting in June. The website was launched on September 15, 2017.

Content

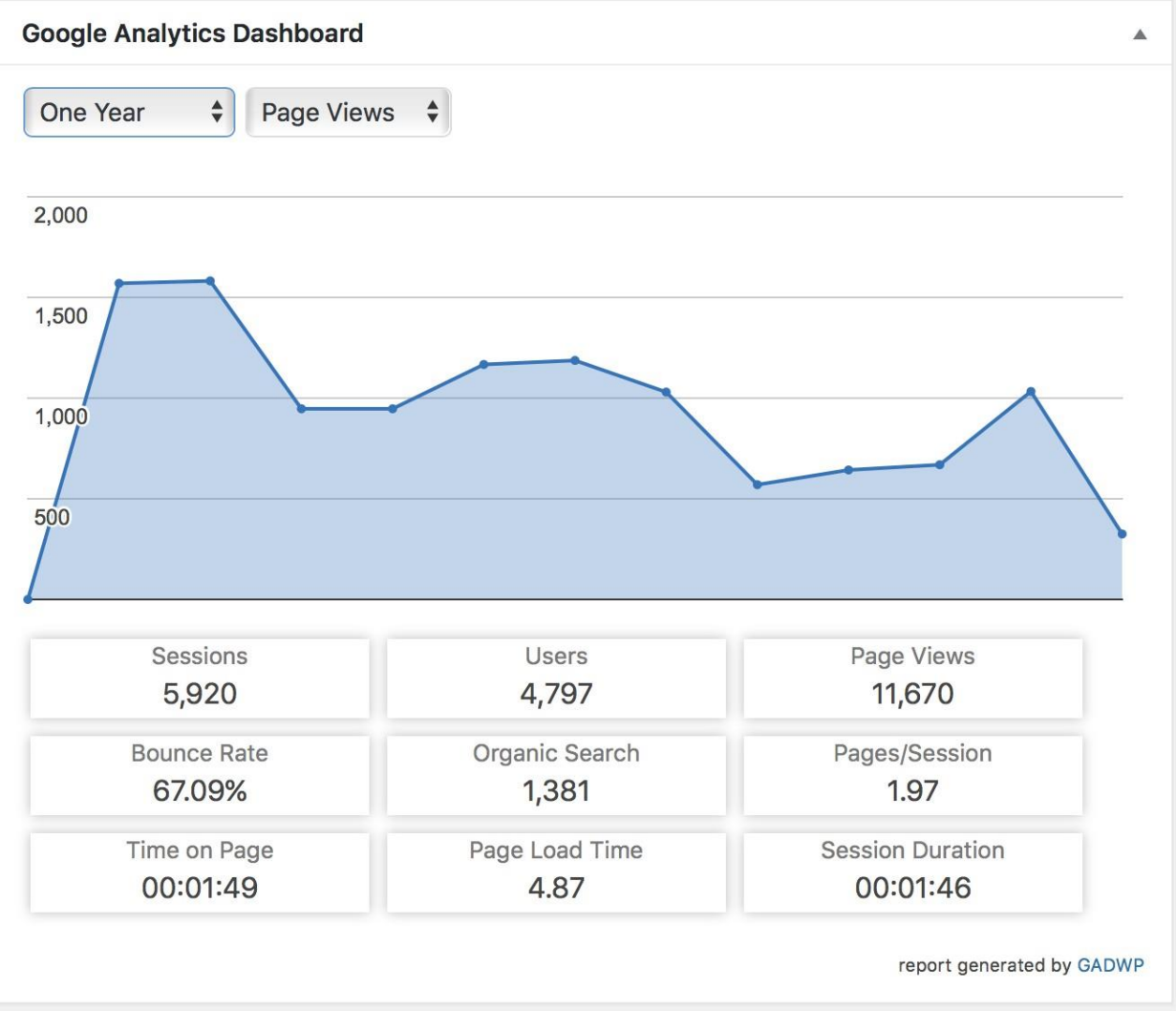
The website is a one stop shop of mathematics related media, events, and activities with a focus on inclusion of women of color. It includes a map and calendar of upcoming events and resources, online videos including the Mathematics Association of America (MAA) Distinguished Lecturer Series featuring women and a link to the video series of “Faces of Women in Math” and “Meet a Mathematician”, links to Association of Women in Mathematics (AWM) travel grant applications, links to the Mathematically Gifted and Black website, and news relevant to the mathematics community. Drop down menus provide resources for students in the mathematical sciences for K-12, Undergrad (including links to AWM chapters), and Grad students.

The website also features dozens of resources for teachers and students at every level within the mathematical sciences. There is also a drop down menu for educators across K-16 and beyond, including links to resources and links from the: Association of Mathematics Teacher Education, National Council of Teachers in Mathematics, The Global Math Project, NRICH - For Math Teachers and Students, The Math Circles for Teachers Network, Park City Math Institute, Research Experiences for Undergraduates and Teachers, and more.

The website serves as a place to find current statistics; The Data & Research drop down menu provides links to reports and interactive graphs that show the proportion of women in the mathematical sciences at every level of education and occupation, as well as statistics on the underrepresentation of men and women who belong to historically underrepresented racial ethnic groups in the mathematical sciences. There are also links to reports including the research on underrepresentation and broadening participation in STEM fields. The website also contains information about the NSF INCLUDES WATCH US grant team, and research reports from the social science research projects funded by the grant. See it all at: http://WomenDoMath.org

User Statistics

In the last year, there have been over 11,000 page views, from over 4,700 users. The average use time was approximately 2 minutes.



Collective Impact

To assess collective impact and to measure changes in WATCH US Stakeholder attendees' attitudes and perceptions, baseline, post, and follow-up surveys were developed by the lead evaluator, Mindy Anderson-Knott, in collaboration with the WATCH US leadership team. The surveys measured the five elements of collaborative infrastructure of collective impact: 1) vision, 2) network and partnerships, 3) goals and metrics, 4) leadership and communication, and 5) expansion, impact and scale.

Methods

A baseline survey was emailed prior to the meeting by the evaluator to 41 potential respondents who had registered to attend the June 2017 stakeholder meeting (the evaluators and a non-mathematician participant were removed from the sample). All 41 participants completed the online survey prior to the meeting, resulting in a 100% response rate. At the conclusion of the meeting, an online post survey was sent to these same attendees (one baseline participant was excluded because they were unable to attend the meeting). The post survey received a 95% response rate, with 38 of 40 participants completing the survey. A follow-up survey was sent to the attendees of the meeting in June 2018 to assess collective impact among this group. Of the 40 attendees, 28 completed the follow-up survey (70% response rate).

The survey was also administered to two other stakeholder groups in June 2018 to further measure collective impact. The first group included stakeholders identified by the PI team as leaders within the mathematics community (see stakeholder interview section for description of sample). Of the 26 stakeholders surveyed from this group, seven completed the survey, resulting in a response rate of 27%. The second group included recipients of the WATCH US prototype awards. Of the 21 award recipients surveyed, 14 completed the survey (67% response rate). This survey also included additional questions specific to the prototype awards.

Results

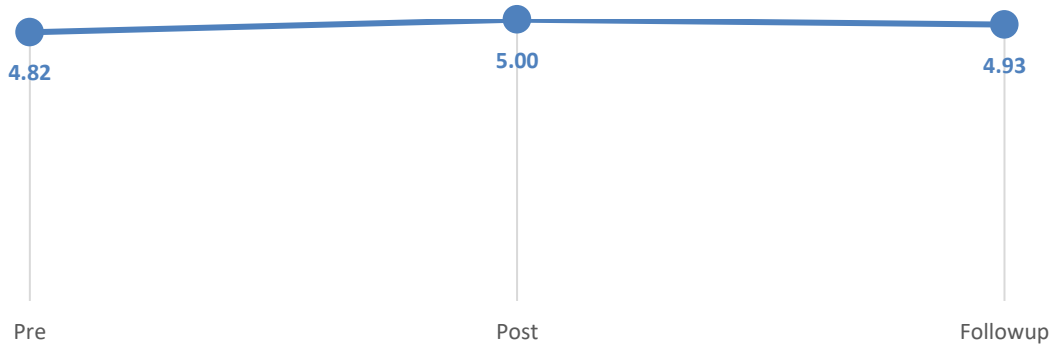
Descriptive analysis was utilized to describe overall stakeholder attitudes and perceptions. Chi square tests were conducted to measure differences between the stakeholders who attended the June 2017 meeting and the prototype award recipients (comparisons to the third group of stakeholders were infeasible due to the small sample size). In addition, survey data were analyzed using paired sample t-tests to test for significant changes over time, testing for changes from before to after the meeting, and then from after the meeting to one year later, among the stakeholders who attended the June 2017 meeting. Frequency distributions, means, and comparisons across time are presented below organized by the five elements of collaborative infrastructure of collective impact: 1) vision, 2) network and partnerships, 3) goals and metrics, 4) leadership and communication, and 5) expansion, impact and scale.

Vision

Surveyed stakeholders are united in their vision that they believe participation of women and underrepresented groups in mathematics should be broadened. The vast majority of all stakeholders (89%) strongly agree with this statement, while none report disagreement. Figure

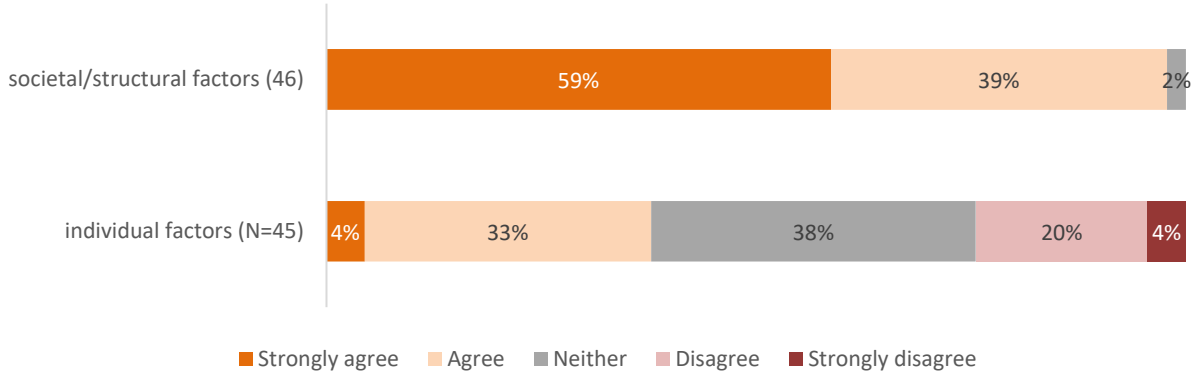
1 shows that stakeholders who attended the June 2017 meeting reported strong agreement with this belief prior to attending the meeting with a mean of 4.82 on a 5-point scale (1=strongly disagree, 5=strongly agree); however, the meeting strengthened the belief to the point where all participants strongly agreed with the statement after attendance (5.0). Moreover, this vision was maintained one year later (4.93).

Figure 1. Stakeholders were unified over time in their belief that the participation of women and underrepresented groups in mathematics should be broadened (N=28).



In general, stakeholders tend to believe that women and underrepresented groups are underrepresented in mathematics as a result of societal/structural factors more so than individual factors. There are not significant differences between the different types of stakeholder groups, but amongst all stakeholders, there is variability of attitudes with regard to the influence of individual factors. As Figure 2 shows, nearly all stakeholders (98%) agree or strongly agree that it is a result of societal/structural factors, but responses are mixed when attributing to individual factors, with 37% strongly agreeing or agreeing, 38% neither agreeing nor disagreeing, and 24% strongly disagreeing or disagreeing.

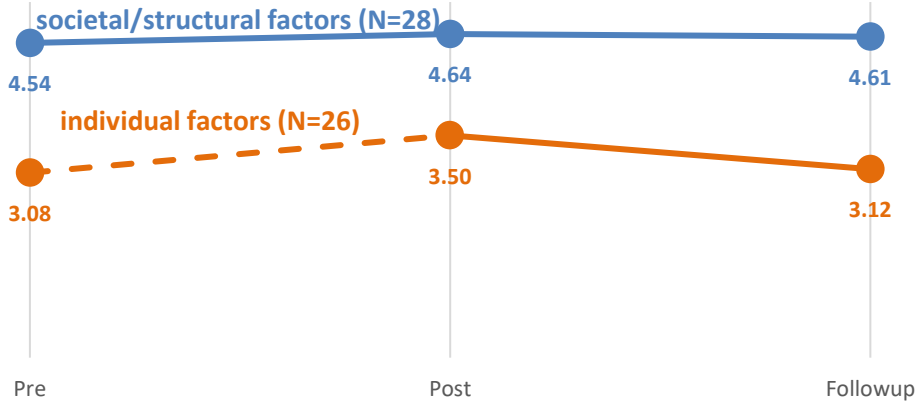
Figure 2. Participants believe underrepresentation is a result of societal/structural factors.



As figure 3 shows, the June 2017 Stakeholder meeting significantly increased attendees' perceptions that individual factors play a role ($p<.05$). This view decreased after the meeting, but the change did not reach statistical significance.

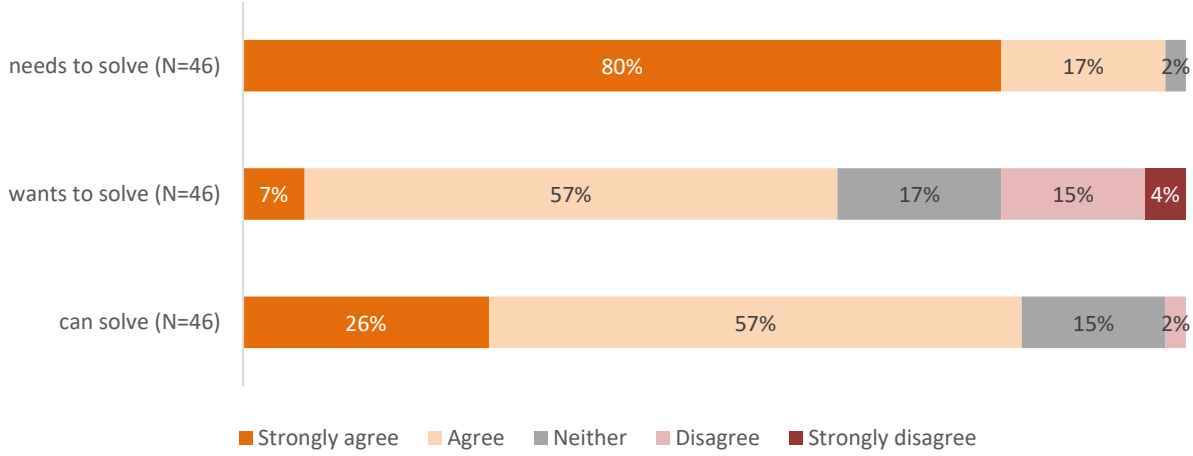
Figure 3. Stakeholders believe underrepresentation is a result of societal/structural factors,

but perceptions of the influence of individual factors significantly increased after attending the June 2017 meeting.



Stakeholders are in agreement that the underrepresentation of women and those who belong to other underrepresented groups in mathematics is a problem that the mathematics community needs to solve, with 80% strongly agreeing (figure 4). However, there is less agreement that the mathematics community wants to solve the problem, where only 7% strongly agree and 19% disagree or strongly disagree. While there is some doubt with regard to the community wanting the solve the problem, stakeholders report an overall optimistic vision with the vast majority agreeing (57%) or strongly agreeing (26%) that the mathematics community can solve the problem.

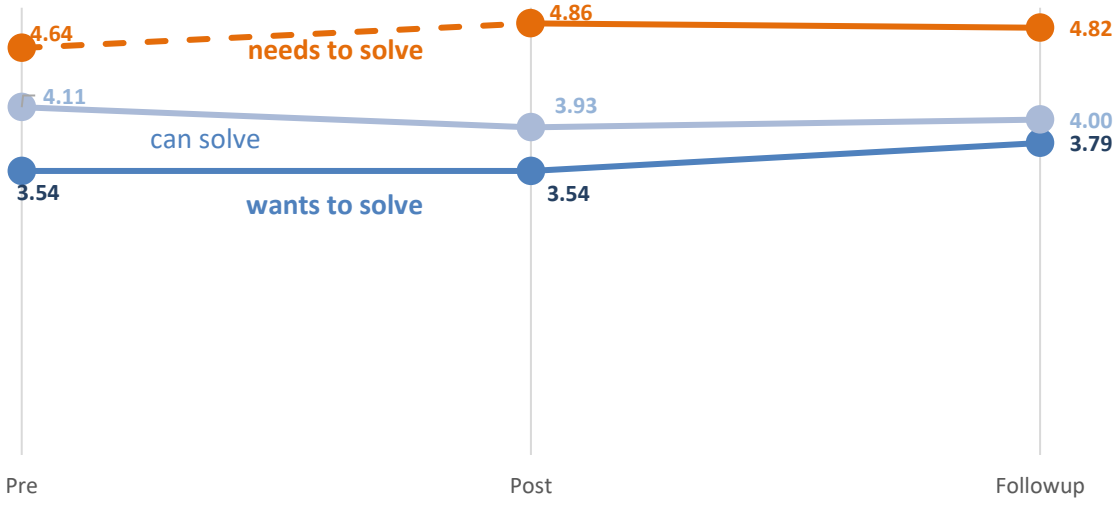
Figure 4. Most believe underrepresentation is a problem that the mathematics community needs to and can solve, but fewer believe the community wants to solve the problem.



While the stakeholders who attended the June 2017 meeting already felt strongly that the problem was one that mathematics community needs to solve prior to attending the meeting, this belief intensified after attending the meeting. As figure 5 shows, the mean increased significantly from 4.64 to 4.86 on a 5-point scale (1=strongly disagree, 5=strongly agree; $p<.05$). Furthermore, this belief was maintained at the same level one year later (4.82). Stakeholder beliefs towards the community's desire to solve the problem or ability to solve the problem did

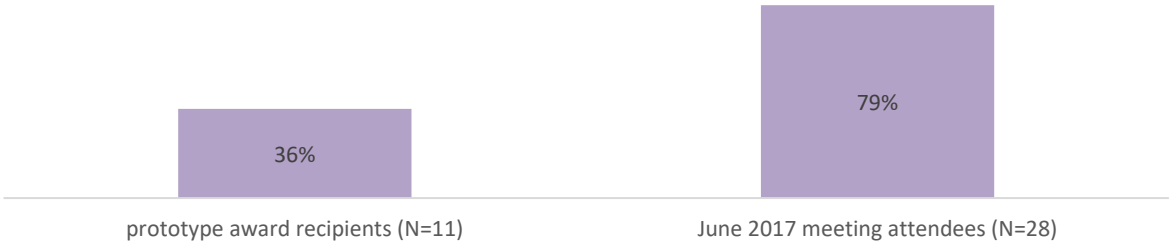
not change significantly over time. Thus, the discussions that happened at the June 2017 meeting impacted the collective vision of the mathematics community in their perceptions of the need to solve the problem, which was a sustained effect. However, the meeting or the continued efforts beyond did not showed measurable significant impacts on the vision of the mathematics community's desire to or ability to solve the problem.

Figure 5. Most believe underrepresentation is a problem that the mathematics community needs to solve, but less believe it is a problem that the community wants to solve. (N=28)



Moreover, there is a significant difference between groups. As figure 6 shows, 79% of the June 2017 stakeholder meeting attendees agree or strongly agree that underrepresentation is a problem that the mathematics community wants to solve, compared to only 36% of prototype award recipients ($p<.05$).

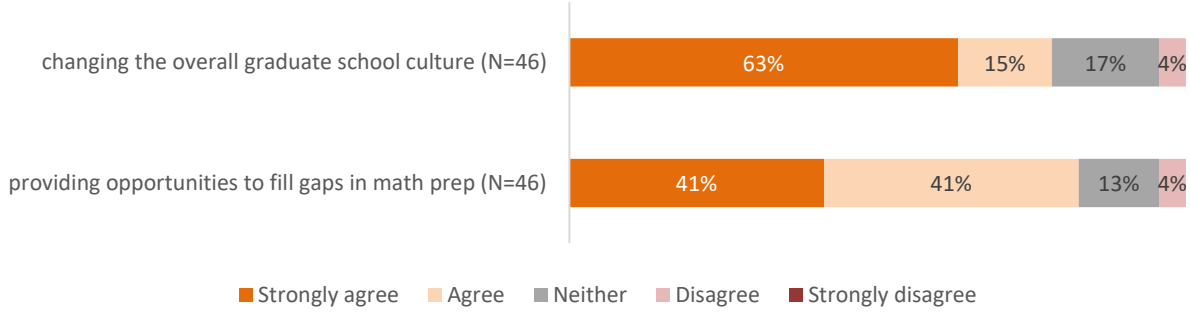
Figure 6. June 2017 meeting attendees are more likely than prototype award recipients to agree that underrepresentation is a problem the mathematics community wants to solve.



When inquiring about what is required to increase the representation of women and underrepresented groups in mathematics, the majority of stakeholders (63%) strongly agree that changing the overall graduate school culture is needed, while over two-fifths (41%) also strongly agree that providing opportunities to fill gaps in mathematical preparation is also needed (figure 7).

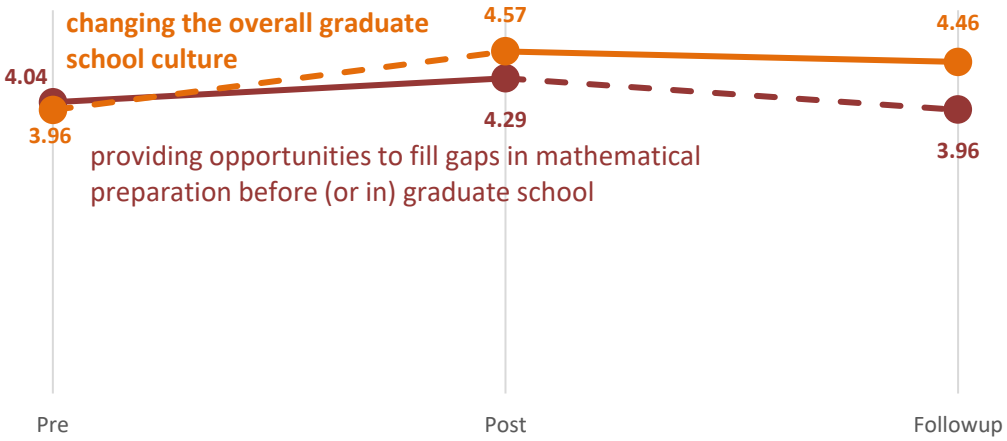
Figure 7. Stakeholders agree that changing the overall graduate school culture is required to

increase the representation of women and underrepresented groups in mathematics.



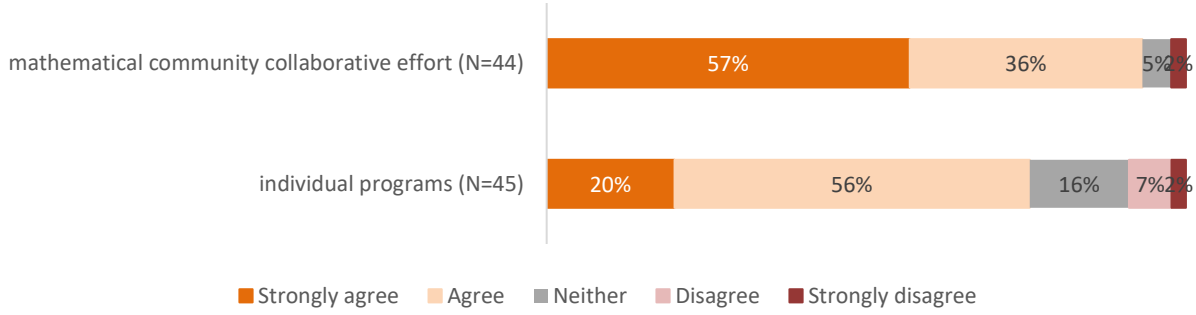
Interestingly, these attitudes shifted over time amongst the stakeholders who attended the June 2017 meeting. Prior to attending the meeting, attendees viewed both aspects similarly (mean=3.96 for changing culture, 4.04 for providing opportunities) on a 5-point scale where 1=strongly disagree and 5=strongly agree (figure 8). After the meeting, stakeholder attitudes toward the influence of changing the graduate school culture increased significantly to 4.57 ($p<.05$), and this was maintained one year later with a mean of 4.46. Attitudes toward the influence of providing opportunities to fill gaps in preparation increased slightly after attending the meeting to 4.29 (non-significant increase), but then decreased significantly after the meeting to 3.96 ($p<.05$). Therefore, stakeholders involved in WATCH US moved toward a sustained and unified vision that increasing the representation of women and underrepresented minorities requires changing the overall graduate school culture rather than providing opportunities to fill gaps in mathematical preparation.

Figure 8. Stakeholders significantly increased their agreement that increasing representation requires changing the overall graduate school culture (N=28).



Nearly all stakeholders agree that increasing the representation of women and underrepresented groups in mathematics is best addressed through a mathematical community collaborative effort, with 93% agreeing or strongly agreeing (figure 9). Three-fourths (76%) also agree or strongly agree that individual programs are the best approach. The change over time did not reach statistical significance.

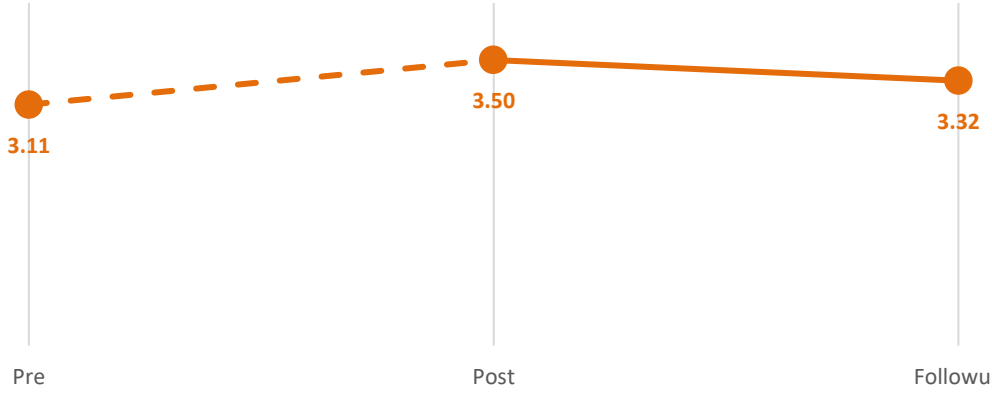
Figure 9. Most stakeholders feel increasing representation is best addressed through a mathematical collaborative effort.



Network/Partnerships

Nearly all of the surveyed stakeholders (91%) feel at least somewhat connected to others in the mathematics community who are dedicated to broadening participation of women and underrepresented groups, with 37% of those feeling very connected. As expected, feelings of connection increased for attendees of the June 2017 meeting. As figure 10 shows, the mean for attendees was 3.11 prior to attending, on a 4-point scale (1=not at all connected, 4=very connected), which increased significantly to 3.50 after attending the meeting ($p<.05$). There was a slight decrease one year later to 3.32, but it was not a significant decrease.

Figure 10. Stakeholders increased connection to others in the mathematics community who are dedicated to broadening participation of women and underrepresented groups (N=28).

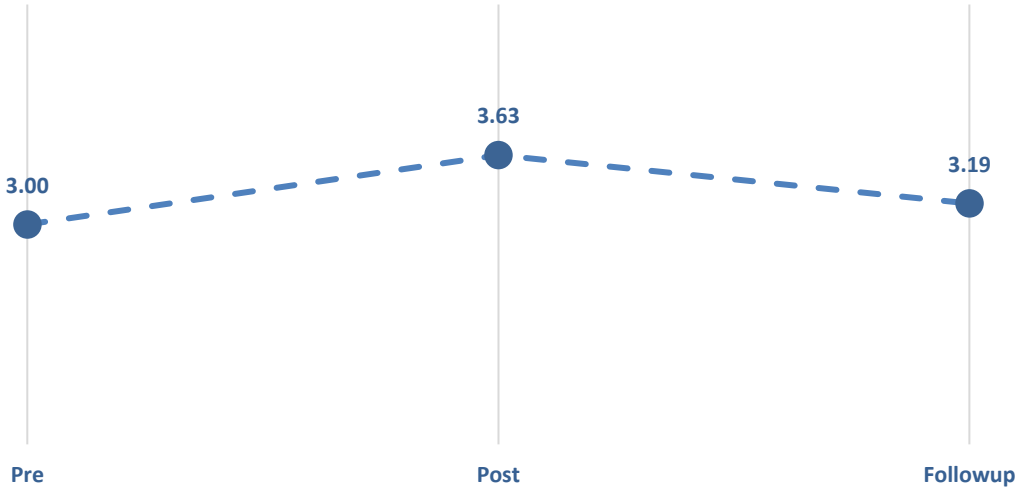


The majority of stakeholders (67%) feel is it somewhat likely that the mathematics community will work together to increase the representation among mathematics PhDs of women and underrepresented groups in the next 5 years, with an additional 15% feeling it is very likely; although 17% feel it is not very likely. The June 2017 attendees showed no significant change over time in this perception.

While feelings of connection are relatively high, stakeholders do not necessarily know how to work with the mathematics community to broaden participation of women and underrepresented minorities. Only one-third (33%) agree or strongly agree that they know how to work with the mathematics community, while nearly half (47%) neither agree nor disagree, and 20% disagree or strongly disagree. The June 2017 stakeholder meeting showed a

significant positive impact in this area, increasing the mean for attendees from 3.00 to 3.63 on a 5-point scale (1=strongly disagree, 5=strongly agree), as shown in figure 11 ($p<.05$). However, the effect was not sustained, with the mean significantly decreasing to 3.19 one year later ($p<.05$). Bringing stakeholders together helped attendees better understand ways to work with the mathematics community to broaden participation, but the effect was lost within a year.

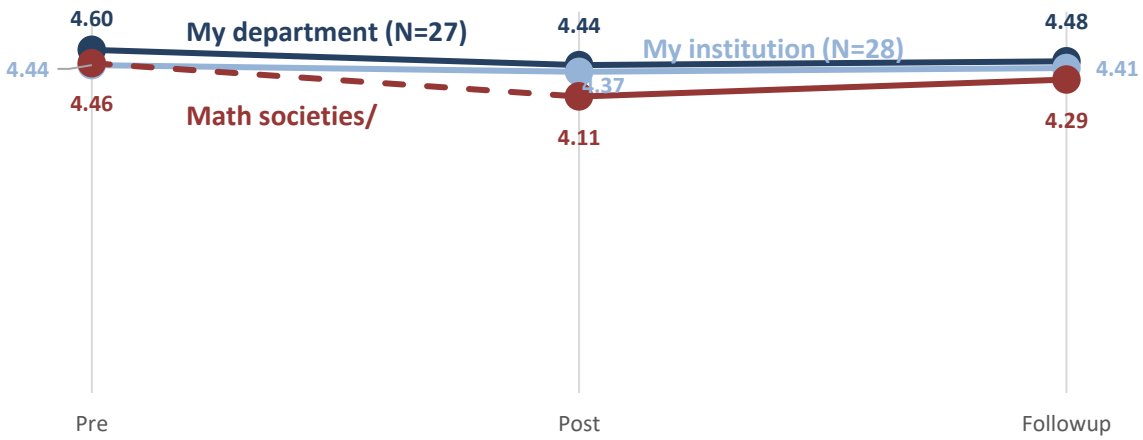
Figure 11. Stakeholders' feelings that they know how to work with the mathematics community increased after attending the meeting, but decreased one year later (N=27).



The vast majority of stakeholders believe that their departments, institutions, and mathematical societies/associations that they belong to believe that the participation of women and underrepresented groups in mathematics should be broadened. Eight-six percent agree or strongly agree that departments believe this, 91% for institutions, and 83% for societies/associations.

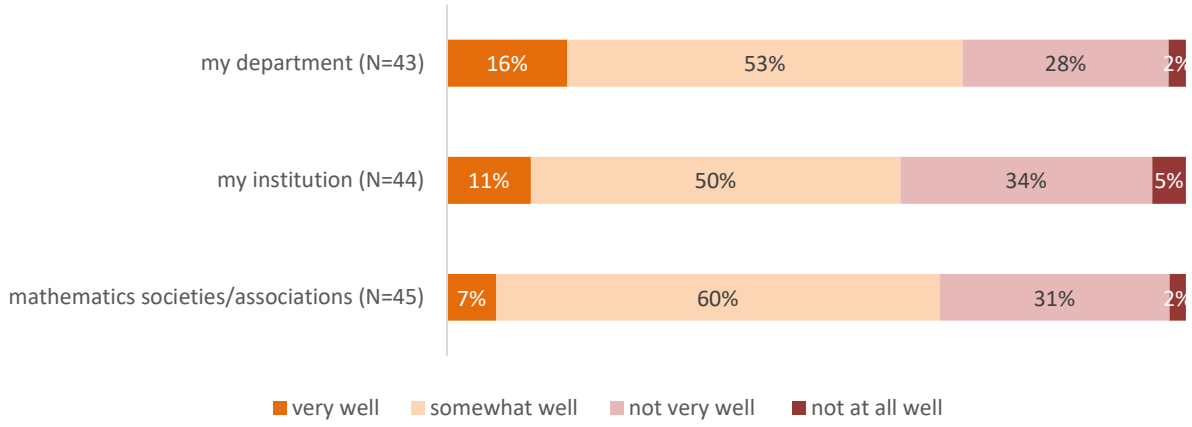
Figure 12 shows the change over time among the stakeholders who attended the June 2017 meeting in their beliefs about how different organizations feel about broadening participation of women and underrepresented minorities in mathematics. The mean significantly decreased for math societies/associations from 4.46 to 4.11 from pre to post on a 5-point scale where 1=strongly disagree and 5=strongly agree ($p<.05$). The mean increased to 4.29 by follow-up, but this was not a significant increase and remained shy of the baseline mean.

Figure 12. Stakeholder beliefs that math societies/associations believe that women and underrepresented groups in mathematics should be broadened decreased after attending the June 2017 meeting.



There were mixed reports regarding how well various partnering organizations understand how to broaden participation of women and underrepresented groups in mathematics. Overall, about half perceive them as understanding somewhat well, with about one-third as not very well (figure 13). There was no significant change over time with these perceptions.

Figure 13. Stakeholders report mixed results for understanding of partnering organizations on how to broaden participation.

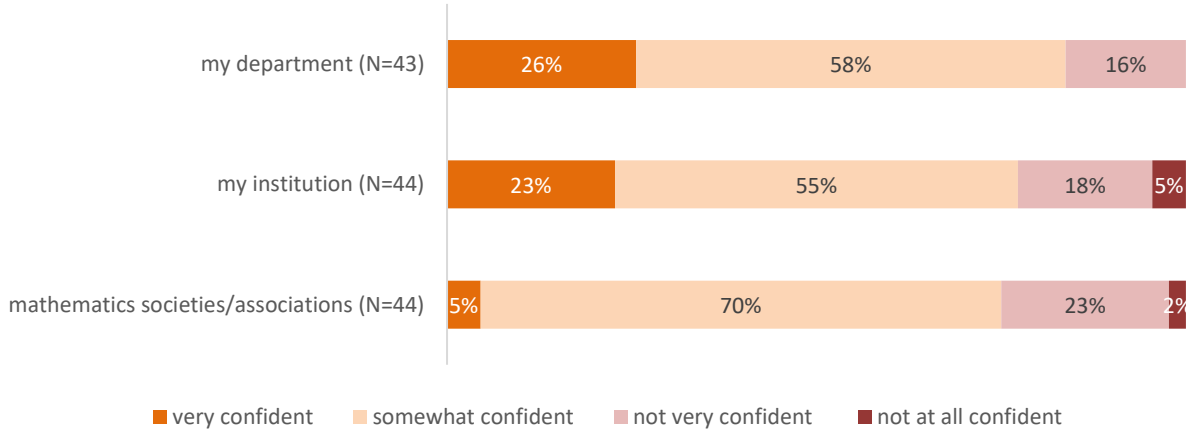


There was a significant difference between stakeholder groups in the perception of how well the department understands, with stakeholders attending the June 2017 meeting perceiving their departments as having a higher level of understanding in comparison to prototype award recipients. As figure 14 shows, 81% of the June 2017 stakeholder meeting attendees feel their departments understand very or somewhat well, compared to only 36% of prototype award recipients ($p<0.5$).

Figure 14. Attendees of the June 2017 stakeholder meeting are more likely than prototype recipients to perceive their department as understanding of how to broaden participation.

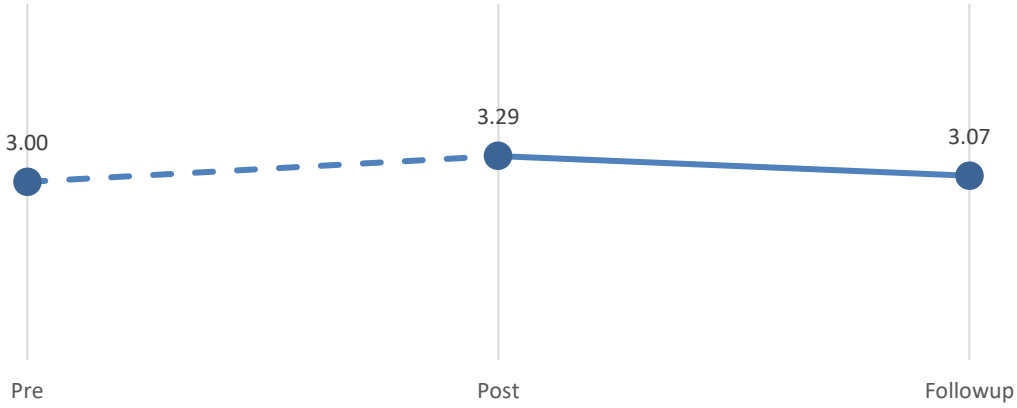
Stakeholder confidence that their partnering organizations will provide effective support to broaden participation shows that the majority are somewhat confident, with more confidence shown for departments and institutions than mathematics societies/associations (figure 15). In addition to the organizations listed, several stakeholders also mentioned that EDGE and Math Alliance provide effective support, and that funding agencies could provide effective support. There was no measured significant change over time in confidence.

Figure 15. Stakeholders are confident that their departments and institutions will provide effective support to broaden participation.



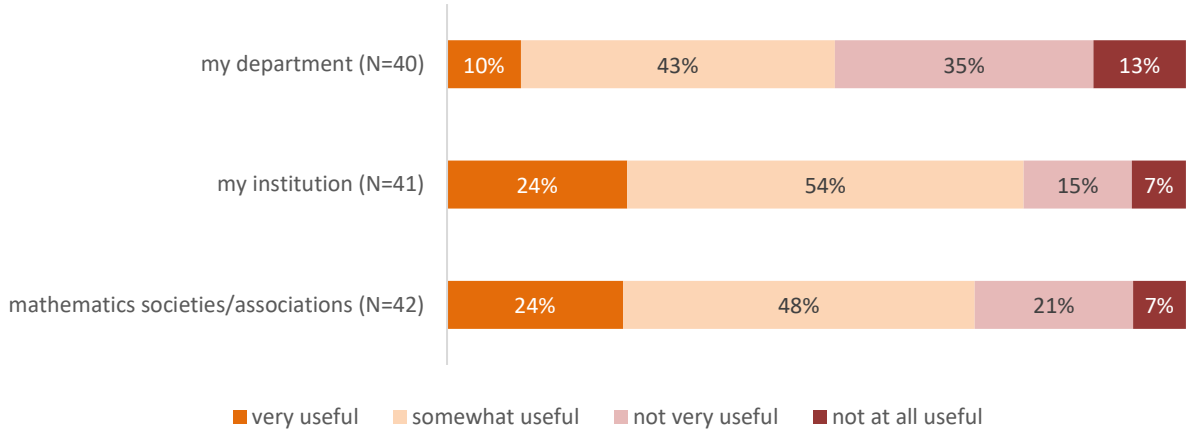
Most stakeholders strongly agree (28%) or agree (57%) that partnerships with social scientists are important in broadening participation of women and underrepresented groups in mathematics. Furthermore, figure 16 shows that opinions of the importance of this partnership increased significantly after attending the June 2017 stakeholder meeting, where the mean increased from 3.00 to 3.29 on a 4-point scale (1=not at all important, 4=very important). The mean decreased to 3.07 one year later, but this change was not statistically significant.

Figure 16. Views of the importance of partnerships with social scientists increased after attending the June 2017 stakeholder meeting (N=28).



While stakeholders believe social scientists are important partners, they do not necessarily believe the social sciences are useful in convincing organizations to improve programs aimed to increase the representation of women and underrepresented groups in mathematics. There is more agreement that the social sciences are useful in convincing stakeholders' institutions and mathematical societies/associations than their departments. Only 10% of stakeholders report the social sciences as very useful in convincing their department, compared to 24% reporting the social sciences as very useful in convincing their institution and mathematics societies/associations (figure 17).

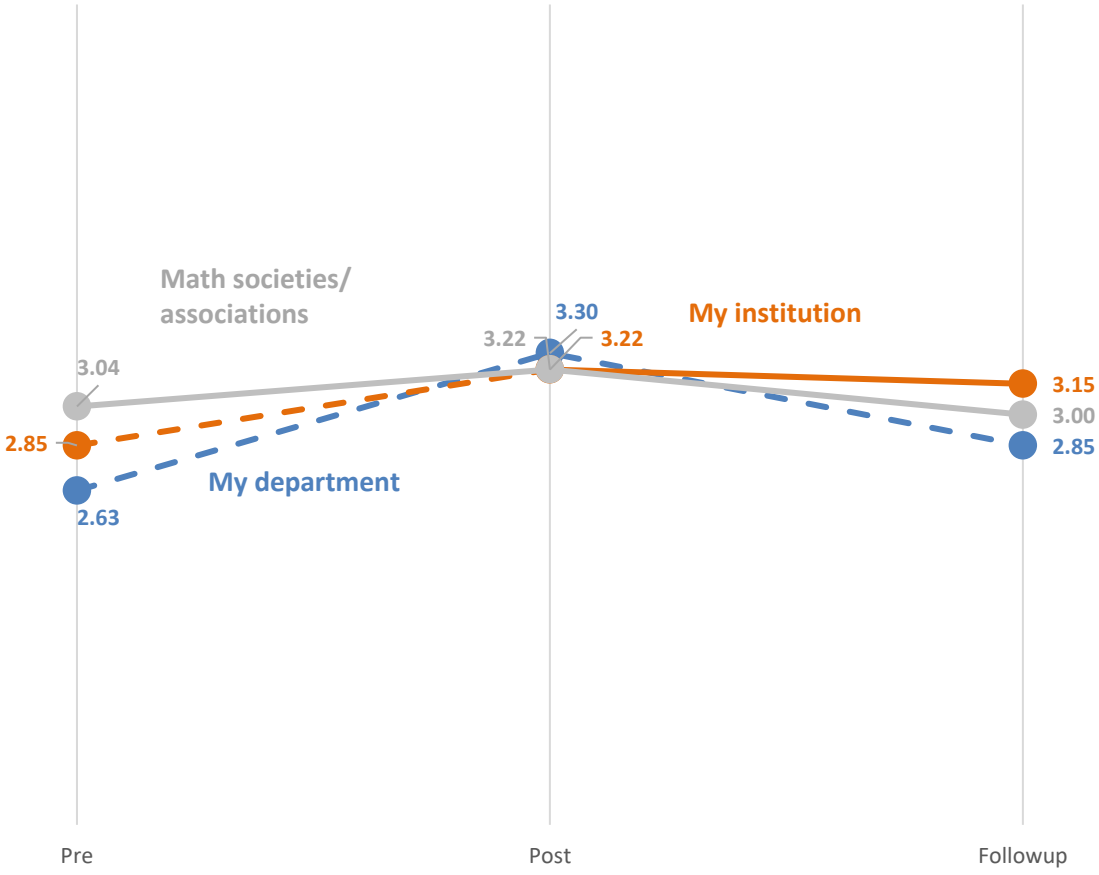
Figure 17. Stakeholders believe the social sciences are useful in convincing their institutions and mathematics societies/associations.



Attendees of the June 2017 stakeholder meeting showed some interesting change over time in these perceptions of the impact of the social sciences in convincing these organizations to improve programs aimed to increase the representation of women and underrepresented groups in mathematics. Their perception of convincing their institution significantly increased from 2.85 to 3.22 from before to after the meeting on a 4-point scale where 1=not at all useful and 4=very useful ($p<.05$), and then remained stable one year later (3.15; figure 18). Similarly, their perception of convincing their department significantly increased from 2.63 to 3.30 from before to after the meeting. However, after the meeting, the mean significantly decreased to 2.85 when measured again one year later. It appears as though the stakeholder meeting increased their perceptions that the social sciences could convince all three types of

organizations; however, after returning to their departments, stakeholders discovered that convincing their departments of the usefulness of social science data may be more difficult than anticipated.

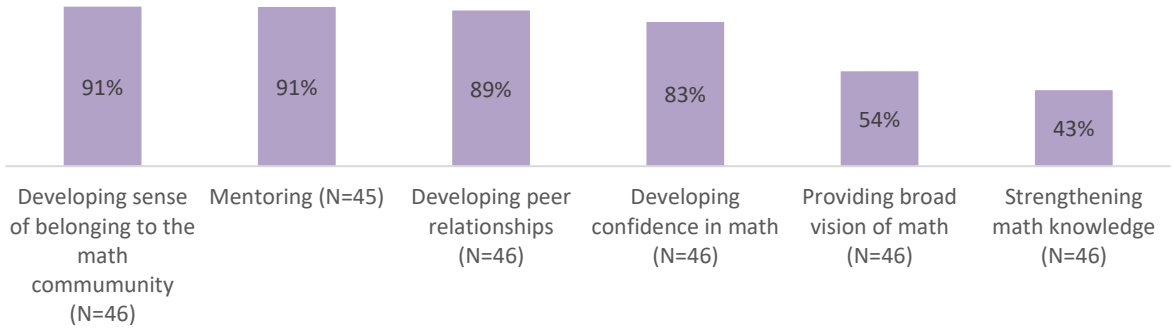
Figure 18. Stakeholder perceptions of the usefulness of social sciences increased for departments and institutions after the June 2017 meeting, but then decreased for departments one year later. (N=27)



Goals/Metrics

Stakeholders identified four elements they feel are most important to the successful implementation of enrichment programs and conferences aiming to broaden participation of women and underrepresented groups in mathematics. As figure 19 shows, 91% strongly agree that developing a sense of belonging to the mathematics community and mentoring are two important elements, followed closely by developing peer relationships (89%) and developing confidence in mathematics (83%). There were no measured significant changes over time.

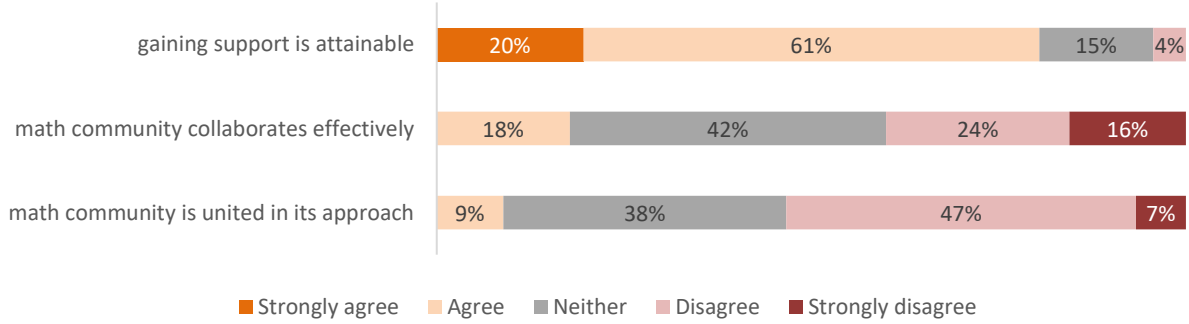
Figure 19. Stakeholders identify four important elements to the successful implementation of enrichment programs and conferences.



Communication/Leadership

The majority of stakeholders believe that gaining support for programming efforts aimed to increase the representation of women and underrepresented groups in mathematics from leaders in the mathematics community is attainable, with 20% strongly agreeing and 61% agreeing (figure 20). However, perceptions of how the mathematics community works together was less favorable. Only 18% of stakeholders agree that the mathematics community collaborates effectively, and only 9% agree that the mathematics community is united in its approach, with no stakeholders strongly agreeing with either statement.

Figure 20. Stakeholders agree that gaining support is attainable, but not that the math community collaborates effectively or is united it its approach.



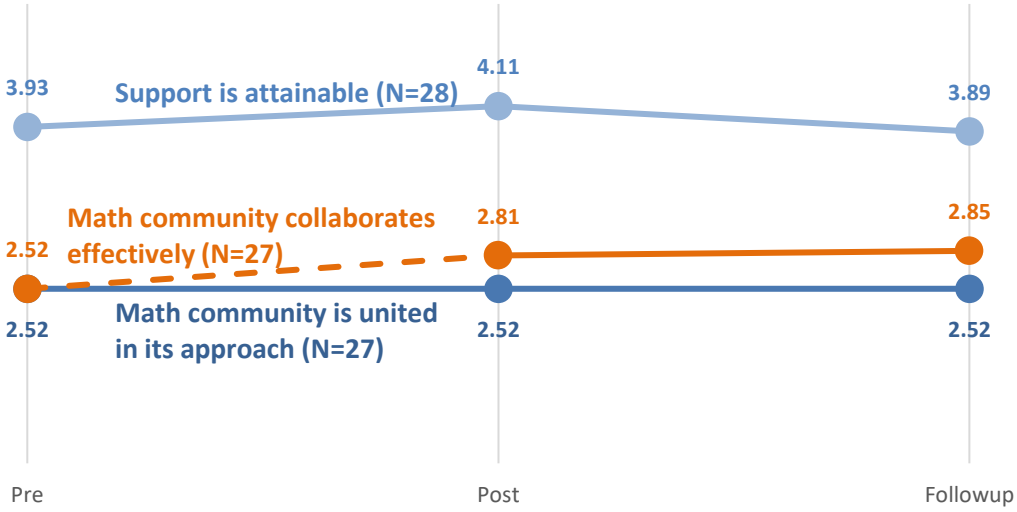
Interestingly, there is a moderately significant difference between stakeholder groups in their

perceptions of how effectively the mathematics community collaborates. As figure 21 shows, 64% of prototype award recipients strongly disagree or disagree that the mathematics community collaborates effectively, compared to only 30% of stakeholders who attended the June 2017 meeting (p<.10). This may reflect the collaborative nature of the June 2017 meeting, which may explain why those stakeholders are more likely to perceive the community as collaborating more effectively, although, only 26% of the June 2017 attendees strongly agree or agree with the statement, with the remaining 44% neither agreeing nor disagreeing.

Figure 21. Prototype award recipients are more likely to disagree than the June 2017 meeting attendees that the math community collaborates effectively.

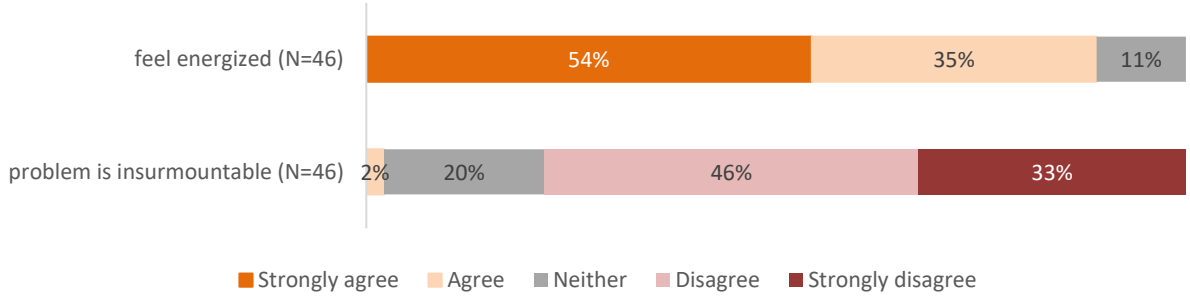
To further support the notion that the June 2017 meeting changed perceptions in this area, there was a significant change in means among attendees. As figure 22 shows, the mean increased on a 5-point scale (1=strongly disagree, 5=strongly agree) from 2.52 before the meeting to 2.81 after the meeting (p<.05), and remained at a similar level one year later (2.85). There were no significant changes over time among perceptions of attaining support or that the mathematics community is united in its approach.

Figure 22. Perceptions that the mathematics community collaborates effectively increased after attending the June 2017 stakeholder meeting.



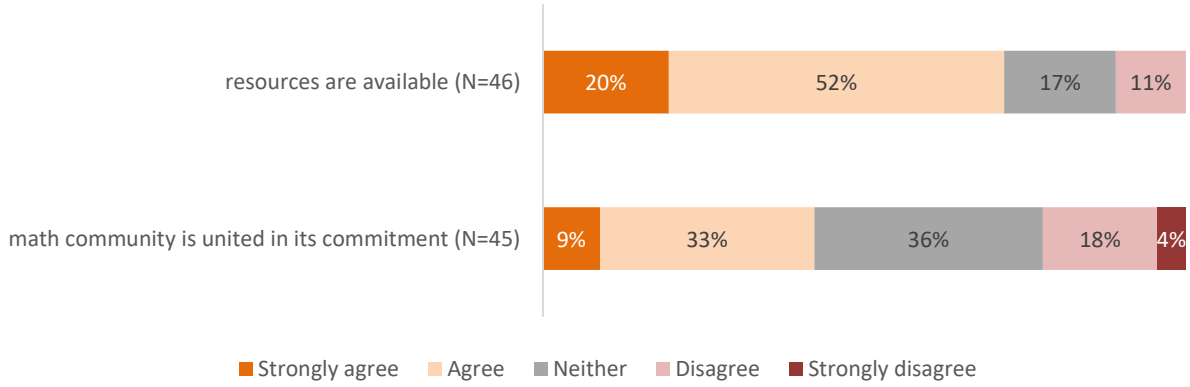
When looking how stakeholders will continue to address the issue of underrepresentation, most stakeholders feel energized and feel the problem is surmountable. Over half (54%) of stakeholders strongly agree that they are energized to increase the representation of women and underrepresentation groups in mathematics, with none disagreeing (figure 23). And the vast majority disagree that increasing the representation of women and underrepresented groups in mathematics beyond current levels is an insurmountable problem, with 46% disagreeing and 33% strongly disagreeing. There were no significant changes over time.

Figure 23. Stakeholders do not feel the problem is insurmountable and they feel energized to increase the representation of women and underrepresentation groups in mathematics.



Most stakeholders agree there are resources available to address the underrepresentation of women and underrepresented groups in mathematics, with 20% strongly agreeing and 52% agreeing (figure 24). However, the results are mixed in perceptions regarding the mathematics community's unification in its commitment. About two-fifths either strongly agree (9%) or agree (33%), about one-fifth either disagree (18%) or strongly disagree (4%), and the remaining (36%) neither agree nor disagree that the mathematics community is united in its commitment to address the underrepresentation of women and underrepresented groups in mathematics.

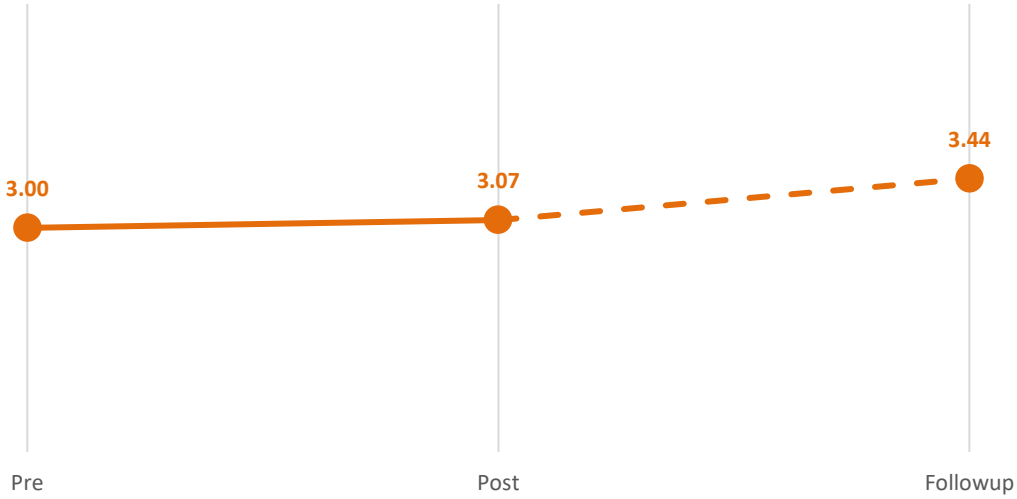
Figure 24. Most stakeholders report resources are available, but are mixed in perceiving that the mathematics community is united in its commitment.



While there were no changes in the perception of resource availability over time, the perceptions regarding the commitment of the mathematics community did change over time. Interestingly, the change did not occur as an immediate result of the June 2017 stakeholder

meeting, but rather was observed one year later. As shown in figure 25, the mean remained stable from 3.00 before the meeting to 3.07 after the meeting, on a 5-point scale (1=strongly disagree, 5=strongly agree), but then increased significantly to 3.44 one year later ($p<.05$). Thus, the stakeholders who attended the June 2017 meeting may have observed the sustained commitment of WATCH US that changed their perceptions that the mathematics community is united in its commitment to address the underrepresentation of women and underrepresented groups in mathematics.

Figure 25. Stakeholder perceptions of the mathematics community's commitment being united increased after the June 2017 stakeholder meeting (N=27).



The majority of stakeholders believe there are concrete steps the mathematics community can take toward increasing the representation of women and underrepresented groups in mathematics, with 78% strongly agreeing with this statement. Among the stakeholders who attended the June 2017 meeting, there was very little change over time, but this is likely due to a ceiling effect since stakeholders already felt this way prior to the meeting.

When asked what those next concrete steps should be, the most commonly mentioned theme was working together toward a common vision, which was identified by six stakeholders. Some specific ways in which stakeholders specified working together included:

> "Have groups working to broaden participation work together and stop being to Territorial in their programs, approaches, and successes and failures"
>
> "…increasing the discourse among the mathematics department faculty and the math ed/sociology faculty, and start a collaboration so we can take a research-based approach to the problem"
>
> "I think it would be helpful to have a 'Common Vision' type document, maybe through CBMS on this topic that comes from all the math societies."

> "I would love to participate in a workshop that gathers together stakeholders (sort of like the original June 2017 meeting) to compare notes, brainstorm, and track progress of different efforts."
>
> "We need to have more open dialogue among ourselves, between people and groups who are NOT necessarily on the same page. This should be done with the backing of social science research, and facilitated by people who know what they are doing. We need to get together to convince federal funding agencies that they need to invest in the long-term growth of our scientific workforce. I think that they will be convinced by research, and by evidence that some interventions do result in change, albeit very slow 'change."

The next most common theme was to support women through the pipeline, mentioned by four. For example, one stakeholder explained, "I would also like to see more conversations between math faculty at undergraduate institutions (e.g. the Cal States) and graduate institutions (e.g. the UCs) to identity and build effective pathways for student to not just enter, but succeed in grad[u]ate schools." Two other common themes were to support programs and to change the culture/structure of graduate programs (each mentioned by three stakeholders). Stakeholders suggest funding for new and existing programs and changing graduate programs by modifying requirements and to "Switch from a 'weed out' culture to a 'nurture' culture."

Stakeholders clearly identified funding as the key resource needed to implement the next steps needed to broaden participation of women and underrepresented groups in mathematics, with 11 identifying this resource. Beyond funding, some other resources needed that were mentioned by two stakeholders each included needing people/leaders to carry out the work, having time for faculty to work on the problem, having discussions about the problem, needing faculty to be willing to work on the problem, and institutional/departmental accountability.

The most commonly mentioned obstacles preventing stakeholders from broadening participation of women and underrepresented groups in mathematics are funding and a lack of interest/support from others to address the problem, which were each mentioned by five stakeholders. In addition to frequently mentioning a lack of funding to support programs, stakeholders described an environment where colleagues do not always understand the problem. Time was also mentioned by four stakeholders as a common obstacle.

Stakeholders who attended the June 2017 meeting were asked what, if anything, they have done differently based on their experiences at the meeting to broaden participation of women and underrepresented groups in mathematics. Four stakeholders mentioned implementing a program, while three mentioned being more involved in existing initiatives, and three mentioned having more confidence that empowered them.

Conclusion

The stakeholders surveyed as part of the WATCH US project are united in their vision that they

believe participation of women and underrepresented groups in mathematics should be broadened, and most believe the problem is a result of societal/structural factors. While stakeholders agree that the mathematics community needs to solve the problem (an attitude that increased significantly as a result of the June 2017 stakeholder meeting), there is less agreement that the community wants to solve the problem. Moreover, this reluctance is especially felt among stakeholders who are actively implementing programming, the prototype award recipients.

In order to broaden participation, most stakeholders believe the best approach is changing the overall graduate school culture, an approach that gained momentum after participating in the June 2017 stakeholder meeting. Nearly all stakeholders also agree that increasing the representation of women and underrepresented groups in mathematics is best addressed through a mathematical community collaborative effort.

Stakeholders feel connected to others in the mathematics community who are dedicated to broadening participation of women and underrepresented groups, and attending the June 2017 meeting significantly increased feelings of connection; however, stakeholders struggle with how to work with the mathematics community to broaden participation. Bringing stakeholders together at the June 2017 meeting helped attendees better understand ways to work with the community, but the effect was lost within a year.

There were mixed reports regarding how well stakeholders perceive their departments, institutions, and mathematics societies/associations understand how to broaden participation of women and underrepresented groups in mathematics, but there is confidence that these units will provide effective support to broaden participation. Interestingly, attendees of the June 2017 meeting were more likely to perceive their departments as having a better understanding than prototype aware recipients, suggesting that those implementing programming may be experiencing challenges with understanding from their departments.

Stakeholders value the use of the social sciences and attending the June 2017 meeting increased their perceptions that the social sciences could convince their departments, institutions, and mathematics societies/associations; however, it appears as though after returning to their departments, stakeholders discovered that convincing their departments of the usefulness of social science data may have been more difficult than anticipated.

Stakeholders identified four elements they feel are most important to the successful implementation of enrichment programs and conferences aiming to broaden participation of women and underrepresented groups in mathematics: 1) developing a sense of belonging to the mathematics community, 2) mentoring, 3) developing peer relationships, and 4) developing confidence in mathematics.

Most stakeholders believe that gaining support for programming efforts aimed to increase the representation of women and underrepresented groups in mathematics from leaders in the mathematics community is attainable. However, few stakeholders agree that the mathematics community collaborates effectively and that the community is united it its approach. While

perceptions remain relatively low, participating in the June 2017 stakeholder meeting did result in a significant increase in perceptions of how effectively the mathematics community collaborates. Thus, the meeting appears to be a step forward in helping the community collaborate more effectively.

Stakeholder perceptions are mixed in their views of how well united the mathematics community in its commitment. Interestingly, there was a significant increase in agreement one year after attending the June 2017 stakeholder meeting, suggesting attendees may have observed the sustained commitment of WATCH US that changed their perceptions that the mathematics community is united in its commitment to address the underrepresentation of women and underrepresented groups in mathematics.

Many stakeholders report the next concrete step is to work together toward a common vision, which will continue efforts to work toward unification. Funding was identified as the key resource required to implement the next steps needed to broaden participation of women and underrepresented groups in mathematics. In addition to a lack of funding, another obstacle that was commonly mentioned as preventing stakeholders from broadening participation of women and underrepresented groups in mathematics was a lack of interest and support from others to address the problem.

Among attendees of the June 2017 meeting, some reported making changes in how they are working toward broadening participation of women and underrepresented groups in mathematics, including implementing programs, being more involved in existing initiatives, and feeling more empowered to address the problem. Many prototype award recipients are still implementing their programming, but the experience thus far is reported as very rewarding by recipients. Many recipients believe they are making a difference by connecting women in mathematics and building that network. Most recipients believe they can sustain some of their programmatic activities without the mini-grant funding by relying on funding from departments, other institutional funding, applying for external funding, and charging participants.

In conclusion, WATCH US initiatives showed some positive impacts and stakeholders are energized to address the issue of broadening participation of women and underrepresented minorities in mathematics. Bringing stakeholders together at the June 2017 meeting showed many positive impacts in attitudes and perceptions, of which many were maintained one year later. Moreover, some additional positive changes were also observed after the meeting, suggesting the collective impact continued through WATCH US initiated collaborations.

Appendix A:
Prototype RFP

NSF INCLUDES WATCH US
Women Achieving Through Community Hubs in the US
Request for Proposals for Prototype Projects

Introduction: WATCH US is a nationwide design and development pilot focused on understanding programs that successfully broaden participation of women in the mathematical sciences. A research study was conducted during 2016-17 to better understand how enrichment programs work to recruit and retain women as they work toward obtaining advanced degrees in the mathematical sciences. We collaborated with six successful programs for women which have collectively served more than 5,000 participants over the span of twenty years.

Through both quantitative and qualitative research methods, we examined the barriers to success including Individual (confidence gap and biased self-assessments), Interactional (social isolation and implicit bias), and Social/Structural (organizational and cultural impediments) and how enrichment programs combat these barriers.

Among the most effective attributes of current and former enrichment programs were found to be:

- **Mentoring** to help participants navigate through critical transition points in their education
- **Providing Role Models** who show participants that women like them have made it through the process before
- **Increasing Confidence** by having the participants work on challenging mathematics in a supportive environment
- **Building a Community of Peers** who will have their backs and provide support as they progress through graduate programs
- **Increasing Understanding of the Process** of graduate school so they know how to apply, thrive, and succeed in graduate school
- **Broadening Knowledge of Mathematics and Careers** so they have a clearer understanding of their futures
- **Providing an Opportunity to Strengthen Core Knowledge** so they have more background for and confidence in their classes

Program Description: We wish to fund prototype projects that will reach a large audience of women, at the undergraduate and/or graduate levels, and provide them with one or more of the attributes (above) that have been proven successful. The prototype projects should be projects that are, ultimately, scalable; that is, could reach a significant percentage of all women considering entering or already in a graduate program in mathematics.

Award Information: We anticipate awarding 10-20 awards of size $2,000-$5,000. At least 90% of the funding must be for participant support, with up to 10% of the total budget for materials. There are no indirect costs or support for the proposer. The awards will be made on a reimbursement basis and will run October 1, 2017—September 30, 2018.

Proposal Preparation and Submission Instructions: Proposals must include the following:

- Cover page, listing
    - Title of project
    - Total amount of funding requested (must be between $2000 and $5000)
    - Information on the applicant(s)
        - Name
        - Affiliation (title, department, and institution)
        - Email address
        - Phone number
    - Information on the institution[1] to which the award should be made (see "Eligibility" below)
        - Name of institution
        - Address of institution
        - DUNS for institution
        - Federal ID Number for institution
- A description (at most two pages) of the proposed prototype activity, which includes an explanation of how the prototype will address one or more of the successful attributes described above. If the proposed activity is a supplement to an existing program or structure, clear indication must be given of how this activity will interact with the existing activities.
- A detailed budget for the requested funds. Again, if the proposed activity is a supplement of an existing program or structure, clear indication must be given of available funding for the existing program, and how the requested funds will interact with existing funds.
- An abbreviated CV (at most two pages) for each person involved in the proposal.

Proposals must be submitted electronically as a single pdf file, via email to Judy Walker at judy.walker@unl.edu. Proposals received by September 15, 2017 will be reviewed and receive a decision by September 30, 2017; proposals will continue to be reviewed after that date on a rolling basis until all funds are dispersed.

Application Review Information: Applications will be judged based on their potential to positively affect women undergraduates or graduate students in one or more of the identified successful program attributes above and on their potential for scalability.

Reporting Requirements: Successful proposals will be required to use a common assessment instrument that we will provide to you.

Eligibility: Awards will be made as Mini-Grants between the University of Nebraska and the applicant's institution. Applicants must hold a faculty position that is eligible for grants at his or her home institution. Student groups wishing to propose a prototype activity through this solicitation should have a faculty member submit on their behalf.

A separate Mini-Grant contract will be issued for those projects chosen for funding. Upon completion of that contract, the awardee will incur the expenses related to the project and then submit receipts for reimbursement.

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[1] The institutional DUNS and Federal ID Number should be available from the institution's sponsored programs office.

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- **Providing an Opportunity to Strengthen Core Knowledge** so they have more background for and confidence in their classes

Program Description: We wish to fund prototype projects that will reach a large audience of women, at the undergraduate and/or graduate levels, and provide them with one or more of the attributes (above) that have been proven successful. The prototype projects should be projects that are, ultimately, scalable; that is, could reach a significant percentage of all women considering entering or already in a graduate program in mathematics.

Award Information: We anticipate awarding 10-20 awards of size $2,000-$5,000. At least 90% of the funding must be for participant support, with up to 10% of the total budget for materials. There are no indirect costs or support for the proposer. The awards will be made on a reimbursement basis and will run October 1, 2017—September 30, 2018.

Proposal Preparation and Submission Instructions: Proposals must include the following:

- Cover page, listing
    - Title of project
    - Total amount of funding requested (must be between $2000 and $5000)
    - Information on the applicant(s)
        - Name
        - Affiliation (title, department, and institution)
        - Email address
        - Phone number
    - Information on the institution[1] to which the award should be made (see "Eligibility" below)
        - Name of institution
        - Address of institution
        - DUNS for institution
        - Federal ID Number for institution
- A description (at most two pages) of the proposed prototype activity, which includes an explanation of how the prototype will address one or more of the successful attributes described above. If the proposed activity is a supplement to an existing program or structure, clear indication must be given of how this activity will interact with the existing activities.
- A detailed budget for the requested funds. Again, if the proposed activity is a supplement of an existing program or structure, clear indication must be given of available funding for the existing program, and how the requested funds will interact with existing funds.
- An abbreviated CV (at most two pages) for each person involved in the proposal.

Proposals must be submitted electronically as a single pdf file, via email to Judy Walker at judy.walker@unl.edu. Proposals received by September 15, 2017 will be reviewed and receive a decision by September 30, 2017; proposals will continue to be reviewed after that date on a rolling basis until all funds are dispersed.

Application Review Information: Applications will be judged based on their potential to positively affect women undergraduates or graduate students in one or more of the identified successful program attributes above and on their potential for scalability.

Reporting Requirements: Successful proposals will be required to use a common assessment instrument that we will provide to you.

Eligibility: Awards will be made as Mini-Grants between the University of Nebraska and the applicant's institution. Applicants must hold a faculty position that is eligible for grants at his or her home institution. Student groups wishing to propose a prototype activity through this solicitation should have a faculty member submit on their behalf.

A separate Mini-Grant contract will be issued for those projects chosen for funding. Upon completion of that contract, the awardee will incur the expenses related to the project and then submit receipts for reimbursement.

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[1] The institutional DUNS and Federal ID Number should be available from the institution's sponsored programs office.

Appendix B: Prototype Survey Instruments

Pre-Test Survey

Thank you for agreeing to fill out this short survey. The purpose of this survey is to learn more about you, your future goals, and about your interests in and experiences of classes and programs in the mathematical sciences. This survey will take you approximately 6-8 minutes to complete.

First, we would like to ask you about your experiences in higher education.

Are you currently attending undergraduate or graduate school?

- ○ Yes
- ○ No

What best describes your role at **your** university/institution?

- ○ Postdoctoral Student
- ○ Staff Member
- ○ Lecturer
- ○ Visiting Faculty
- ○ Nontenured Research Faculty
- ○ Pre-tenure Assistant Professor
- ○ Associate or Full Professor (Tenured or Tenure-track)
- ○ _____ Other faculty
- ○ _____ Other non-faculty

What degree are you currently seeking?

- ○ A Bachelor's Degree
- ○ A Master's Degree
- ○ A Doctoral Degree
- ○ _____ Other, please explain

What is your class standing?

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior

What YEAR will you graduate?

When you graduate from your current program, what area(s) do you expect your degree to be in? (check all that apply)

- ☐ Mathematics or Applied Mathematics
- ☐ Statistics/Biostatistics
- ☐ Data Science
- ☐ K-12 Mathematics Education
- ☐ Computer Science
- ☐ Engineering
- ☐ Business
- ☐ Social Sciences
- ☐ Medicine
- ☐ Other, please explain
- ☐ I don't know

Have you already applied or are you currently in the process of applying to graduate school?

- ○ Yes
- ○ No

What type of program(s) are you applying to? (check all that apply)

- [ ] Graduate school in the mathematical sciences
- [ ] Graduate school in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering
- [ ] Graduate School in the social sciences
- [ ] Graduate school in the humanities or arts
- [ ] Graduate school in business
- [ ] Graduate school in education
- [ ] A professional school (e.g. JD, MD, Pharm.D, etc.)
- [ ] Other, please explain

Specifically, what type of graduate program in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering are you applying to?

Please tell me about your interests in applying to graduate school or professional school in the following areas?

	Not at all interested	Somewhat interested	Interested	Very Interested
Mathematics or Applied Mathematics	○	○	○	○
Statistics/Biostatistics	○	○	○	○
Data Science	○	○	○	○
Physical/Natural Science	○	○	○	○
Biological or Agricultural Science	○	○	○	○
Engineering	○	○	○	○
Technology/Computer Science	○	○	○	○
K-12 math or science education	○	○	○	○

	Not at all interested	Somewhat interested	Interested	Very Interested
Business	○	○	○	○
Social Sciences	○	○	○	○
Humanities/Arts	○	○	○	○
Medicine	○	○	○	○
Law	○	○	○	○

What type of job do you hope to have after you complete all of your schooling?

- ○ Private Industry/Business
- ○ Non-Profit/Government
- ○ Practice Law or Medicine
- ○ K-12 Teaching
- ○ Higher Education
- ○ _____ other, please explain

Pre program attitudes

People define the word "friend" in various ways. For the following question, please use your own definition of "friend" in a way that makes sense to you.

How many **friends** do you have who are in the mathematical sciences? (Please provide your best estimate)

Total number of friends in the mathematical sciences	
How many of these friends are the same gender as you?	
How many of these friends are of a similar racial/ethnic background as you?	

How many **role models** do you have who are in the mathematical sciences? (Please provide your best estimate)

Total number of role models in the mathematical sciences	
How many of these role models are the same gender as you?	
How many of these role models are of a similar racial/ethnic background as you?	

Do you have someone you would feel comfortable talking to about the following topics?

	Yes, I have someone I could talk to	Maybe, I might have someone I could talk to	No, I don't have anyone to talk to	Not Applicable
Required coursework to obtain your degree	○	○	○	○
Experiencing unfair treatment by an instructor	○	○	○	○
Applying to graduate school in mathematics	○	○	○	○
Potential job opportunities in the mathematical sciences	○	○	○	○
Experiencing harassment from another student	○	○	○	○
Feeling excluded from peers in the mathematical sciences	○	○	○	○

Please describe your confidence in the following . . .

	Not at all confident	Somewhat confident	Confident	Very Confident	Not Applicable
Working on mathematics problems	○	○	○	○	○
Discussing mathematics with peers in the classroom	○	○	○	○	○

	Not at all confident	Somewhat confident	Confident	Very Confident	Not Applicable
Discussing mathematics with peers outside of the classroom	○	○	○	○	○
Discussing mathematics with instructors	○	○	○	○	○
Participating in study groups for classes in the mathematical sciences	○	○	○	○	○
Succeeding as a student in a mathematical sciences graduate program	○	○	○	○	○

How much do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Careers in academia in mathematics will allow me to balance work, family, and leisure	○	○	○	○	○
Careers in industry in mathematics (private or public non-profit/government) will allow me to balance work, family, and leisure	○	○	○	○	○
There are barriers to women and other underrepresented minority groups in mathematics	○	○	○	○	○
The mathematics community is inclusive of people who belong to race/ethnic groups historically underrepresented in mathematics	○	○	○	○	○

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The mathematics community is inclusive to people who are low income	O	O	O	O	O
The mathematics community is inclusive to women	O	O	O	O	O

How much do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I belong in the mathematics community	O	O	O	O	O
I am a mathematics kind of person	O	O	O	O	O
Other people see me as a mathematics kind of person	O	O	O	O	O
I enjoy mathematics	O	O	O	O	O
I am good at mathematics	O	O	O	O	O
I have been recognized for my work in mathematics	O	O	O	O	O
I know how to apply to graduate school in the mathematical sciences	O	O	O	O	O
I am interested in continuing in mathematics	O	O	O	O	O
I want to be a mathematician	O	O	O	O	O

Please describe how likely you are to do the following . . .

	I have already done this	Very likely	Likely	Unlikely	Very Unlikely
Enroll in more classes in the mathematical sciences	○	○	○	○	○
Ask a peer for advice on applying to graduate school in the mathematical sciences	○	○	○	○	○
Ask a professor for advice on applying to graduate school in the mathematical sciences	○	○	○	○	○
Attend graduate school in the mathematical sciences	○	○	○	○	○
Pursue a career in industry in the mathematical sciences	○	○	○	○	○
Pursue a career in academia doing research in the mathematical sciences	○	○	○	○	○
Pursue a career teaching the mathematical sciences at the K-12 level	○	○	○	○	○
Pursue a career teaching in the mathematical sciences at the college level	○	○	○	○	○

Block 3

Do you currently have, or do you anticipate having, a formal role as a mentor or study group leader to other students within the mathematical sciences?

- ○ Yes
- ○ Maybe/I don't know
- ○ No

Demographics

What is your birthday? (mm/dd/yyyy)

What is the zip code where you live for most of the year?

Would you say the neighborhood you grew up in was . . .

- ○ Urban
- ○ Suburban
- ○ Rural

Did at least one of your parent(s)/guardian(s) earn a four year college degree?

- ○ Yes
- ○ No
- ○ I don't know

Are you Spanish, Hispanic, or Latino?

- ○ Yes
- ○ No

Choose one or more races that you consider yourself to be:

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Other

What Best Describes your Gender?

- ○ Male
- ○ Female
- ○

What is your sexual orientation?

- ○ asexual
- ○ bisexual
- ○ gay/lesbian
- ○ heterosexual/straight
- ○ queer
- ○

Are you now married, widowed, divorced, separated or never married?

- ○ Married (living together)
- ○ Married (living apart)
- ○ Not married, but living with a partner (Cohabiting)
- ○ Widowed
- ○ Divorced
- ○ Separated
- ○ Never Married

Do you have any children?

- ○ Yes
- ○ No

Pre/Post Survey

Thank you for agreeing to fill out this short survey. The purpose of this survey is to learn more about you, your interest/experience participating in classes and programs in the mathematical sciences and your plans for your future. You are receiving the survey because you participated in programming as part of ${e://Field/ExternalDataReference}. This survey will take you approximately 8-10 minutes to complete.

First, we would like to ask you about your experiences in higher education.

Are you currently attending undergraduate or graduate school?

- ○ Yes
- ○ No

What best describes your role at **your** university/institution?

- ○ Postdoctoral Student
- ○ Staff Member
- ○ Lecturer
- ○ Visiting Faculty
- ○ Nontenured Research Faculty
- ○ Pre-tenure Assistant Professor
- ○ Associate or Full Professor (Tenured or Tenure-track)
- ○ _____ Other faculty
- ○ _____ Other non-faculty

What degree are you currently seeking?

- ○ A Bachelor's Degree
- ○ A Master's Degree

- ○ A Doctoral Degree
- ○ [ ] Other, please explain

What is your class standing?

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior

What YEAR will you graduate?

[ ]

When you graduate from your current program, what area(s) do you expect your degree to be in? (check all that apply)

- ☐ Mathematics or Applied Mathematics
- ☐ Statistics/Biostatistics
- ☐ Data Science
- ☐ K-12 Mathematics Education
- ☐ Computer Science
- ☐ Engineering
- ☐ Business
- ☐ Social Sciences
- ☐ Medicine
- ☐ Other, please explain
- ☐ I don't know

Have you already applied or are you currently in the process of applying to graduate school?

- ○ Yes
- ○ No

What type of program(s) are you applying to? (check all that apply)

- ☐ Graduate school in the mathematical sciences
- ☐ Graduate school in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering
- ☐ Graduate School in the social sciences
- ☐ Graduate school in the humanities or arts
- ☐ Graduate school in business
- ☐ Graduate school in education
- ☐ A professional school (e.g. JD, MD, Pharm.D, etc.)
- ☐ _____ Other, please explain

Specifically, what type of graduate program in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering program are you applying to?

Please tell me about your interests in applying to graduate school or professional school in the following areas both BEFORE and AFTER your participation in ${e://Field/ExternalDataReference} . . .

	How interested were you in applying to graduate school in the following areas BEFORE you attended THIS program?				How interes school in the
	Not at all Interested	Somewhat Interested	Interested	Very Interested	Not at all interested
Mathematics or Applied Mathematics	○	○	○	○	○
Statistics/Biostatistics	○	○	○	○	○
Data Science	○	○	○	○	○
Physical/Natural Science	○	○	○	○	○

	How interested were you in applying to graduate school in the following areas BEFORE you attended THIS program?				How interes school in the
	Not at all Interested	Somewhat Interested	Interested	Very Interested	Not at all interested
Biological or Agricultural Science	○	○	○	○	○
Engineering	○	○	○	○	○
Technology/Computer Science	○	○	○	○	○
K-12 math or science education	○	○	○	○	○
Business	○	○	○	○	○
Social Sciences	○	○	○	○	○
Humanities/Arts	○	○	○	○	○
Medicine	○	○	○	○	○
Law	○	○	○	○	○

What type of job do you hope to have after you complete all of your schooling?

- ○ Private Industry/Business
- ○ Non-Profit/Government
- ○ Practice Law or Medicine
- ○ K-12 Teaching
- ○ Higher Education
- ○ _____ other, please explain

Post program attitudes

People define the word "friend" in various ways. For the following question, please use your own definition of "friend" in a way that makes sense to you.

How many **friends** did you have who are in the mathematical sciences **BEFORE** ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of friends in the mathematical sciences BEFORE	
How many of these friends are the same gender as you?	
How many of these friends are of a similar racial/ethnic background as you?	

How many **friends** do you have who are in the mathematical sciences now that you have participated in ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of friends in the mathematical sciences AFTER	
How many of these friends are the same gender as you?	
How many of these friends are of a similar racial/ethnic background as you?	

How many **role models** did you have who are in the mathematical sciences

BEFORE ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of role models in the mathematical sciences BEFORE	
How many of these role models are the same gender as you?	
How many of these role models are of a similar racial/ethnic background as you?	

How many **role models** do you have who are in the mathematical sciences now that you have participated in ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of role models who are in the mathematical science AFTER	
How many of these role models are the same gender as you?	
How many of these role models are of a similar racial/ethnic background as you?	

Do you have someone you feel comfortable talking to about the following topics?

	Yes, I have someone I could talk	Maybe, I might know someone I could talk to	No, I don't have anyone to talk to	Not Applicable

	Yes, I have someone I could talk	Maybe, I might know someone I could talk to	No, I don't have anyone to talk to	Not Applicable
Required coursework to obtain your degree	○	○	○	○
Experiencing unfair treatment by an instructor	○	○	○	○
Applying to graduate school in mathematics	○	○	○	○
Potential job opportunities in the mathematical sciences	○	○	○	○
Experiencing harassment from another student	○	○	○	○
Feeling excluded from peers in the mathematical sciences	○	○	○	○

Please tell me about your confidence in the following both BEFORE and AFTER you attended ${e://Field/ExternalDataReference} programming . . .

	How confident were you in the following areas BEFORE you attended THIS program?				How were you in the following are you attended THIS progra		
	Not at all confident	Somewhat confident	Confident	Very Confident	Not at all confident	Somewhat confident	Confide
Working on mathematics problems	○	○	○	○	○	○	○
Discussing mathematics with peers in the classroom	○	○	○	○	○	○	○
Discussing mathematics with peers outside of the classroom	○	○	○	○	○	○	○

	How confident were you in the following areas BEFORE you attended THIS program?				How were you in the following are you attended THIS progra		
	Not at all confident	Somewhat confident	Confident	Very Confident	Not at all confident	Somewhat confident	Confide
Discussing mathematics with instructors	○	○	○	○	○	○	○
Participating in study groups for classes in the mathematical sciences	○	○	○	○	○	○	○
Succeeding as a student in a mathematical sciences graduate program	○	○	○	○	○	○	○

Please tell me how much you agree with following statements BEFORE and AFTER you attended ${e://Field/ExternalDataReference} programming . . .

	How much did you agree or disagree with the following statement BEFORE you participated in this program?					How mu following s
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree
I belong in the mathematics community	○	○	○	○	○	○
I am a mathematics kind of person	○	○	○	○	○	○
Other people see me as a mathematics kind of person	○	○	○	○	○	○
I enjoy mathematics	○	○	○	○	○	○
I am good at mathematics	○	○	○	○	○	○
I have been recognized for my work in mathematics	○	○	○	○	○	○

	How much did you agree or disagree with the following statement BEFORE you participated in this program?					How mu following s
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree
I know how to apply to graduate school in the mathematical sciences	○	○	○	○	○	○
I am interested in continuing in mathematics	○	○	○	○	○	○
I want to be a mathematician	○	○	○	○	○	○

Please tell me how much you agree with following statements BEFORE and AFTER you attended ${e://Field/ExternalDataReference} programming . . .

	How much did you agreed or disagree with the following statement BEFORE ${e://Field/ExternalDataReference}?					How much did you agreed or dis statement AFTER you ${e://Field/ExternalDat		
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree	Disagree	Neither nor disa
Careers in academia in mathematics will allow me to balance work, family, and leisure	○	○	○	○	○	○	○	○
Careers in industry in mathematics (private or public non-profit/government) will allow me to balance work, family, and leisure	○	○	○	○	○	○	○	○
There are barriers to women and people who belong to other underrepresented minority groups in mathematics	○	○	○	○	○	○	○	○

	How much did you agreed or disagree with the following statement BEFORE ${e://Field/ExternalDataReference}?					How much did you agreed or dis statement AFTER you ${e://Field/ExternalDat		
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree	Disagree	Neither nor disa
The mathematics community is inclusive of people who belong to race/ethnic groups historically underrepresented in mathematics	○	○	○	○	○	○	○	○
The mathematics community is inclusive to people who are low income	○	○	○	○	○	○	○	○
The mathematics community is inclusive to women	○	○	○	○	○	○	○	○

Please describe how your participation in ${e://Field/ExternalDataReference} programming influenced your likelihood of doing the following?

	I had already done this before attending this program	What likelihood did you have of doing the following BEFORE you participated in ${e://Field/ExternalDataReference}?				What likelihood d following AFTE ${e://Field/Exte	
		Unlikely	Somewhat likely	Likely	Very likely	Unlikely	Somewha
Enroll in more classes in the mathematical sciences	○	○	○	○	○	○	○

		What likelihood did you have of doing the following BEFORE you participated in ${e://Field/ExternalDataReference}?			What likelihood d following AFTE ${e://Field/Exte	
	I had already done this before attending this program	Unlikely	Somewhat likely	Likely	Very likely	Unlikely	Somewha
Ask a peer for advice on applying to graduate school in the mathematical sciences							
Ask a professor for advice on applying to graduate school in the mathematical sciences							
Attend graduate school in the mathematical sciences							
Pursue a career in industry in the mathematical sciences							
Pursue a career in academia doing research in the mathematical sciences							
Pursue a career teaching K-12 in the mathematical sciences							

	I had already done this before attending this program	What likelihood did you have of doing the following BEFORE you participated in ${e://Field/ExternalDataReference}?				What likelihood d following AFTE ${e://Field/Exte	
		Unlikely	Somewhat likely	Likely	Very likely	Unlikely	Somewha
Pursue a career teaching in higher education in the mathematical sciences	○	○	○	○	○	○	○

Block 3

Have you had, or do you anticipate having, a formal role (e.g. as a peer mentor, study group leader, etc.) to other students within the mathematical sciences as part of ${e://Field/ExternalDataReference}?

- ○ Yes
- ○ Maybe
- ○ No

Demographics

What is your birthday? (mm/dd/yyyy)

What is the zip code where you live for most of the year?

Would you say the neighborhood you grew up in was . . .

- ○ Urban
- ○ Suburban
- ○ Rural

Did at least one of your parent(s)/guardian(s) earn a four year college degree?

- ○ Yes
- ○ No
- ○ I don't know

Are you Spanish, Hispanic, or Latino?

- ○ Yes
- ○ No

Choose one or more races that you consider yourself to be:

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Other

What best describes your gender?

- ○ Male
- ○ Female
- ○

What is your sexual orientation?

- asexual
- bisexual
- gay/lesbian
- heterosexual/straight
- queer
-

Are you now married, widowed, divorced, separated or never married?

- Married (living together)
- Married (living apart)
- Not married, but living with a partner (Cohabiting)
- Widowed
- Divorced
- Separated
- Never Married

Do you have any children?

- Yes
- No

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Post-Survey

Thank you for agreeing to fill out this short survey. The purpose of this survey is to learn more about you, your future goals, and about your interests in and

experiences participating in ${e://Field/ExternalDataReference} . This survey will take you approximately 8-10 minutes to complete.

First, we would like to ask you about your experiences in higher education. Are you currently attending undergraduate or graduate school?

- Yes
- No

What best describes your role at **your** university/institution?

- Postdoctoral Student
- Staff Member
- Lecturer
- Visiting Faculty
- Nontenured Research Faculty
- Pre-tenure Assistant Professor
- Associate or Full Professor (Tenured or Tenure-track)
- [ ] Other faculty
- [ ] Other non-faculty

What degree are you currently seeking?

- A Bachelor's Degree

- ○ A Master's Degree
- ○ A Doctoral Degree
- ○ [ ] Other, please explain

When you graduate from your current program, what area(s) do you expect your degree to be in? (check all that apply)

- ☐ Mathematics or Applied Mathematics
- ☐ Statistics/Biostatistics
- ☐ Data Science
- ☐ K-12 Mathematics Education
- ☐ Computer Science
- ☐ Engineering
- ☐ Business
- ☐ Social Sciences
- ☐ Medicine
- ☐ [ ] Other, please explain

Have you already applied or are you currently in the process of applying to graduate school?

- ○ Yes
- ○ No

What type of program(s) are you applying to? (check all that apply)

- ☐ Graduate school in the mathematical sciences
- ☐ Graduate school in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering
- ☐ Graduate School in the social sciences
- ☐ Graduate school in the humanities or arts

- [ ] Graduate school in business
- [ ] Graduate school in education
- [ ] A professional school (e.g. JD, MD, Pharm.D, etc.)
- [ ] _____ Other, please explain

Specifically, what type of graduate program in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering program are you applying to?

Please tell me about your interests in applying to graduate school or professional school in the following areas?

	Not at all interested	Somewhat interested	Interested	Very Interested
Mathematics or Applied Mathematics	○	○	○	○
Statistics/Biostatistics	○	○	○	○
Data Science	○	○	○	○
Physical/Natural Science	○	○	○	○
Biological or Agricultural Science	○	○	○	○
Engineering	○	○	○	○
Technology/Computer Science	○	○	○	○
K-12 math or science education	○	○	○	○
Business	○	○	○	○
Social Sciences	○	○	○	○
Humanities/Arts	○	○	○	○
Medicine	○	○	○	○
Law	○	○	○	○

What type of job do you hope to have after you complete all of your schooling?

- ○ Private Industry/Business
- ○ Non-Profit/Government
- ○ Practice Law or Medicine
- ○ K-12 Teaching
- ○ Higher Education
- ○ [ ] other, please explain

Pre program attitudes

People define the word "friend" in various ways. For the following question, please use your own definition of "friend" in a way that makes sense to you.

How many **friends** do you have in the mathematical sciences? (Please provide your best estimate)

Total number of friends	
How many of these friends are the same gender as you?	
How many of these friends are of a similar racial/ethnic background as you?	

How many **role models** do you have in the mathematical sciences? (Please provide your best estimate)

Total number of role models	
How many of these role models are the same gender as you?	
How many of these role models are of a similar racial/ethnic background as you?	

Do you have someone you would feel comfortable talking to about the following topics?

	Yes, I have someone I could talk	Maybe, I might know someone I could talk to	No, I don't have anyone to talk to	Not Applicable
Required coursework to obtain your degree	○	○	○	○
Experiencing unfair treatment by an instructor	○	○	○	○
Applying to graduate school in mathematics	○	○	○	○
Potential job opportunities in the mathematical sciences	○	○	○	○
Experiencing harassment from another student	○	○	○	○
Feeling excluded from peers in the mathematical sciences	○	○	○	○

Please describe your confidence in the following . . .

	Not at all confident	Somewhat confident	Confident	Very Confident	Not Applicable
Working on mathematics problems	○	○	○	○	○
Discussing mathematics with peers in the classroom	○	○	○	○	○
Discussing mathematics with peers outside of the classroom	○	○	○	○	○
Discussing mathematics with instructors	○	○	○	○	○

	Not at all confident	Somewhat confident	Confident	Very Confident	Not Applicable
Participating in study groups for classes in the mathematical sciences	○	○	○	○	○
Succeeding as a student in a mathematical sciences graduate program	○	○	○	○	○

How much do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Careers in academia in mathematics will allow me to balance work, family, and leisure	○	○	○	○	○
Careers in industry in mathematics (private or public non-profit/government) will allow me to balance work, family, and leisure	○	○	○	○	○
There are barriers to women and other underrepresented minority groups in mathematics	○	○	○	○	○
The mathematics community is inclusive for people who belong to race/ethnic groups historically underrepresented in mathematics	○	○	○	○	○
The mathematics community is inclusive to people who are low income	○	○	○	○	○

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The mathematics community is inclusive to women	O	O	O	O	O

How much do you agree with the following statements?

	Strongly disagree	Disagree	Agree	Strongly agree
I belong in the mathematics community	O	O	O	O
I am a mathematics kind of person	O	O	O	O
Other people see me as a mathematics kind of person	O	O	O	O
I enjoy mathematics	O	O	O	O
I am good at mathematics	O	O	O	O
I have been recognized for my work in mathematics	O	O	O	O
I know how to apply to graduate school in the mathematical sciences	O	O	O	O
I am interested in continuing in mathematics	O	O	O	O
I want to be a mathematician	O	O	O	O

Please describe how likely you are to do the following . . .

	I have already done

this	Very likely	Likely	Unlikely	Very Unlikely

	I have already done this	Very likely	Likely	Unlikely	Very Unlikely
Enroll in more classes in the mathematical sciences	○	○	○	○	○
Ask a peer for advice on applying to graduate school in the mathematical sciences	○	○	○	○	○
Ask a professor for advice on applying to graduate school in the mathematical sciences	○	○	○	○	○
Attend graduate school in the mathematical sciences	○	○	○	○	○
Pursue a career in industry in the mathematical sciences	○	○	○	○	○
Pursue a career in academia doing research in the mathematical sciences	○	○	○	○	○
Pursue a career teaching K-12 in the mathematical sciences	○	○	○	○	○
Pursue a career teaching in higher education in the mathematical sciences					

Post-test specific Undergrad

How did your experience at ${e://Field/ExternalDataReference} influence your likelihood of choosing to pursue an advanced degree in the mathematical sciences?

○ Greatly Increased

○ Somewhat Increased

- No effect
- Somewhat Decreased
- Greatly Decreased
- Not Applicable

How important were your peer interactions at ${e://Field/ExternalDataReference} in influencing you to pursue an advanced degree in the mathematical sciences?

- Very Important
- Somewhat Important
- Not very Important
- Not at all important
- Not Applicable

How important were the mentors or role models that you identified at ${e://Field/ExternalDataReference} in influencing you to pursue an advanced degree in the mathematical sciences?

- Very Important
- Somewhat Important
- Not very Important
- Not at all important
- Not Applicable

Did the content that you learned at ${e://Field/ExternalDataReference} help you in your undergraduate coursework?

- The content I learned help me a lot
- The content I learned help me a little
- The content I learned didn't help me at all
- Not Applicable

Has your experience at ${e:/Field/Program} helped you, or do you believe it will help you, with your graduate school application process?

- It made/will make the graduate school application process easier
- it didn't/won't have an effect
- It made/will make the graduate school application process harder
- Not Applicable

Graduate School Post-test

How did your experience at ${e://Field/ExternalDataReference} influence your motivation to continue with your graduate degree coursework ?

- Greatly Increased
- Increased
- No effect/I would have continued regardless
- Decreased
- Greatly Decreased
- Not Applicable

Did the content that you learned at ${e://Field/ExternalDataReference} help you in your graduate coursework?

- The content I learned help me a lot
- The content I learned help me a little
- The content I learned didn't help me at all
- Not Applicable

How important were your peer interactions at ${e://Field/ExternalDataReference} in motivating you to persist in your graduate school coursework?

○ Very Important ○ Important ○ Somewhat Important ○ Not at all important ○ Not Applicable

How important are the mentors or role models that you made at ${e://Field/ExternalDataReference} in motivating you to persist in your graduate coursework?

○ Extremely important ○ Very important ○ Moderately important ○ Slightly important ○ Not at all important ○ Not applicable

Did you have a research experience through your participation at ${e://Field/ExternalDataReference}?

○ Yes ○ Maybe ○ No

How important were any research experiences you had at ${e://Field/ExternalDataReference} in motivating you to persist in graduate school?

○ It made me much more likely to persist ○ it made made me somewhat more likely to persist ○ It had no impact

- ○ It made me somewhat less likely to persist
- ○ It made me much less likely to persist

What overall effect has participating in ${e://Field/ExternalDataReference} had on your successful completion of your graduate degree?

- ○ It made me much more likely to successfully complete my graduate degree
- ○ It made me somewhat more likely to successfully complete my graduate degree
- ○ It had no impact
- ○ It made me somewhat less likely to successfully complete my graduate degree
- ○ It made me much less likely to successfully complete my graduate degree

Final

Did you serve as a mentor or role model to others as part of your participation in ${e://Field/ExternalDataReference}?

- ○ Yes
- ○ Maybe
- ○ No

How important was your experience as a mentor or role model in ${e://Field/ExternalDataReference} in . . .

	Not at all important	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences	○	○	○	○	○
lowering your confidence in the mathematical sciences	○	○	○	○	○

	Not at all important	Somewhat important	No effect	Important	Very Important
identifying as a math person	○	○	○	○	○
motivating you to persist in future coursework in the mathematical sciences	○	○	○	○	○
motivating you to persist in other STEM fields	○	○	○	○	○
motivating you to pursue a career in K-12 mathematics education	○	○	○	○	○
motivating you to pursue a career in research in the mathematical sciences	○	○	○	○	○

Did you present at a conference as part of your participation in ${e:/ Field/Program}?

- ○ Yes
- ○ Maybe
- ○ No

How important was your experience presenting at a conference at ${e://Field/ExternalDataReference} in . ..

	Not at all important	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences	○	○	○	○	○
lowering your confidence in the mathematical sciences	○	○	○	○	○

	Not at all importan	Somewha t importan	No	Importan	Very Importan t
identifying as a math person	○	○	○	○	○
motivating you to persist in future coursework in the mathematical sciences	○	○	○	○	○
motivating you to persist in other STEM fields	○	○	○	○	○
motivating you to pursue a career in K-12 mathematics education	○	○	○	○	○
motivating you to pursue a career in research in the mathematical sciences	○	○	○	○	○

Did you learn about barriers to participation in math and science for persons who belong to underrepresented groups in math and science (e.g. women, people of color, low income, rural, disability, etc.) as part of your participation in ${e://Field/ExternalDataReference}?

- ○ Yes
- ○ Maybe
- ○ No

How important was the information that you learned about barriers to participationin math and science for persons who belong to underrepresented groups in math and science (e.g. women, people of color, low income, rural, disability, etc.) in . . .

	Not at all importan t	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences	○	○	○	○	○

	Not at all importan	Somewha t importan	No	Importan	Very Importan t
lowering your confidence in the mathematical sciences	○	○	○	○	○
identifying as a math person	○	○	○	○	○
motivating you to persist in future coursework in the mathematical sciences	○	○	○	○	○
motivating you to persist in other STEM fields	○	○	○	○	○
motivating you to pursue a career in K–12 mathematics education	○	○	○	○	○
motivating you to pursue a career in research in the mathematical sciences	○	○	○	○	○

Did you learn about implicit biases, stereotype threat or discrimination within the mathematical sciences as part of your participation

in ${e://Field/ExternalDataReference}${e:/ Field/Program}?

- ○ Yes
- ○ Maybe
- ○ No

How important was the information that you learned about implicit biases, stereotype threat or discrimination within the mathematical sciences in . . .

	Not at all importan t	Somewhat important	No effect Important	Very Important

	Not at all important	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences	○	○	○	○	○
lowering your confidence in the mathematical sciences	○	○	○	○	○
identifying as a mathematics person	○	○	○	○	○
motivating you to persist in future coursework in the mathematical sciences	○	○	○	○	○
motivating you to persist in other STEM fields	○	○	○	○	○
motivating you to pursue a career in K-12 mathematics education	○	○	○	○	○
motivating you to pursue a career in research in the mathematical sciences	○	○	○	○	

How much did your experience of the mathematics content

at ${e://Field/ExternalDataReference} affect your confidence in your mathematics ability?

○ Increased my confidence a lot
○ Increased my confidence a little
○ Did not affect my confidence
○ Decreased my confidence a little
○ Decreased my confidence a lot

Please describe in what ways, if any, ${e://Field/ExternalDataReference} had an impact on your future career?

Please describe any program elements or experiences that you found particularly meaningful or had a positive impact on your future educational or career goals?

Demographics

What is your birthday? (mm/dd/yyyy)

What is the zip code where you live for most of the year?

Would you say the neighborhood you grew up in was . . .

- Urban
- Suburban
- Rural

Did at least one of your parent(s)/guardian(s) earn a four year college degree?

- ○ Yes
- ○ No
- ○ I don't know

Are you Spanish, Hispanic, or Latino?

- ○ Yes
- ○ No

Choose one or more races that you consider yourself to be:

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Other

What Best Describes yourGender?

- ○ Mal e
- ○ Female

What is your sexual orientation?

- ○ asexual
- ○ bisexual
- ○ gay/lesbian
- ○ heterosexual/straight
- ○ queer

Are you now married, widowed, divorced, separated or never married?

- ○ Married (living together)
- ○ Married (living apart)
- ○ Not married, but living with a partner (Cohabiting)
- ○ Widowed
- ○ Divorced
- ○ Separated
- ○ Never Married

Do you have any children?

- ○ Yes
- ○ No

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Post Only Survey

Thank you for agreeing to fill out this short survey. The purpose of this survey is to learn more about you, your interest/experience participating in classes and programs in the mathematical sciences and your plans for your future. You are receiving the survey because you participated in programming as part of the Mathematics Project at Minnesota (MPM). This survey will take you approximately 12-15 minutes to complete.

First, we would like to ask you about your experiences in higher education.

Are you currently attending undergraduate or graduate school?

- ○ Yes
- ○ No

What best describes your role at **your** university/institution?

- ○ Postdoctoral Student
- ○ Staff Member
- ○ Lecturer
- ○ Visiting Faculty
- ○ Nontenured Research Faculty
- ○ Pre-tenure Assistant Professor
- ○ Associate or Full Professor (Tenured or Tenure-track)
- ○ _____ Other faculty
- ○ _____ Other non-faculty

What degree are you currently seeking?

- ○ A Bachelor's Degree
- ○ A Master's Degree
- ○ A Doctoral Degree

○ Other, please explain

What is your class standing?

○ Freshman
○ Sophomore
○ Junior
○ Senior

What YEAR will you graduate?

When you graduate from your current program, what area(s) do you expect your degree to be in? (check all that apply)

☐ Mathematics or Applied Mathematics
☐ Statistics/Biostatistics
☐ Data Science
☐ K-12 Mathematics Education
☐ Computer Science
☐ Engineering
☐ Business
☐ Social Sciences
☐ Medicine
☐ Other, please explain
☐ I don't know

Have you already applied or are you currently in the process of applying to graduate school?

○ Yes

- ○ No

What type of program(s) are you applying to? (check all that apply)

- ☐ Graduate school in the mathematical sciences
- ☐ Graduate school in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering
- ☐ Graduate School in the social sciences
- ☐ Graduate school in the humanities or arts
- ☐ Graduate school in business
- ☐ Graduate school in education
- ☐ A professional school (e.g. JD, MD, Pharm.D, etc.)
- ☐ _____ Other, please explain

Specifically, what type of graduate program in the biological/agricultural sciences, physical/natural sciences, technology/computer sciences, or engineering program are you applying to?

_____

Please tell me about your interests in applying to graduate school or professional school in the following areas both BEFORE and AFTER your participation in ${e://Field/ExternalDataReference} . . .

	How interested were you in applying to graduate school in the following areas BEFORE you attended ${e://Field/ExternalDataReference}?				How interes school in the ${e://F
	Not at all Interested	Somewhat Interested	Interested	Very Interested	Not at all interested
Mathematics or Applied Mathematics	○	○	○	○	○
Statistics/Biostatistics	○	○	○	○	○
Data Science	○	○	○	○	○
Physical/Natural Science	○	○	○	○	○

	How interested were you in applying to graduate school in the following areas BEFORE you attended ${e://Field/ExternalDataReference}?				How interes school in the ${e://F
	Not at all Interested	Somewhat Interested	Interested	Very Interested	Not at all interested
Biological or Agricultural Science	○	○	○	○	○
Engineering	○	○	○	○	○
Technology/Computer Science	○	○	○	○	○
K-12 math or science education	○	○	○	○	○
Business	○	○	○	○	○
Social Sciences	○	○	○	○	○
Humanities/Arts	○	○	○	○	○
Medicine	○	○	○	○	○
Law	○	○	○	○	○

What type of job do you hope to have after you complete all of your schooling?

- ○ Private Industry/Business
- ○ Non-Profit/Government
- ○ Practice Law or Medicine
- ○ K-12 Teaching
- ○ Higher Education
- ○ _____ other, please explain

Post program attitudes

People define the word "friend" in various ways. For the following question, please use your own definition of "friend" in a way that makes sense to you.

How many **friends** did you have who are in the mathematical sciences **BEFORE** ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of friends in the mathematical sciences BEFORE ${e://Field/ExternalDataReference}

How many of these friends are the same gender as you?

How many of these friends are of a similar racial/ethnic background as you?

How many **friends** do you have who are in the mathematical sciences now that you have participated in ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of friends in the mathematical sciences AFTER ${e://Field/ExternalDataReference}

How many of these friends are the same gender as you?

How many of these friends are of a similar racial/ethnic background as you?

How many **role models** did you have who are in the mathematical sciences

BEFORE ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of role models in the mathematical sciences BEFORE ${e://Field/ExternalDataReference}

How many of these role models are the same gender as you?

How many of these role models are of a similar racial/ethnic background as you?

How many **role models** do you have who are in the mathematical sciences now that you have participated in ${e://Field/ExternalDataReference}? (Please provide your best estimate)

Total number of role models who are in the mathematical science AFTER ${e://Field/ExternalDataReference}

How many of these role models are the same gender as you?

How many of these role models are of a similar racial/ethnic background as you?

Do you have someone you feel comfortable talking to about the following topics?

	Yes, I have someone I could talk	Maybe, I might know someone I could talk to	No, I don't have anyone to talk to	Not Applicable
Required coursework to obtain your degree	○	○	○	○
Experiencing unfair treatment by an instructor	○	○	○	○
Applying to graduate school in mathematics	○	○	○	○
Potential job opportunities in the mathematical sciences	○	○	○	○
Experiencing harassment from another student	○	○	○	○
Feeling excluded from peers in the mathematical sciences	○	○	○	○

Please tell me about your confidence in the following both BEFORE and AFTER you attended ${e://Field/ExternalDataReference} programming . . .

	How confident were you in the following areas BEFORE you attended ${e://Field/ExternalDataReference}?				How were you in the following are you attended ${e://Field/ExternalDataRefer		
	Not at all confident	Somewhat confident	Confident	Very Confident	Not at all confident	Somewhat confident	Confide
Working on mathematics problems	○	○	○	○	○	○	○
Discussing mathematics with peers in the classroom	○	○	○	○	○	○	○

	How confident were you in the following areas BEFORE you attended ${e://Field/ExternalDataReference}?				How were you in the following are you attended ${e://Field/ExternalDataRefer		
	Not at all confident	Somewhat confident	Confident	Very Confident	Not at all confident	Somewhat confident	Confide
Discussing mathematics with peers outside of the classroom	○	○	○	○	○	○	○
Discussing mathematics with instructors	○	○	○	○	○	○	○
Participating in study groups for classes in the mathematical sciences	○	○	○	○	○	○	○
Succeeding as a student in a mathematical sciences graduate program	○	○	○	○	○	○	○

Please tell me how much you agree with following statements BEFORE and AFTER you attended ${e://Field/ExternalDataReference} programming . . .

	How much did you agree or disagree with the following statement BEFORE you participated in ${e://Field/ExternalDataReference}?					How mu following ${e:
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree
I belong in the mathematics community	○	○	○	○	○	○
I am a mathematics kind of person	○	○	○	○	○	○
Other people see me as a mathematics kind of person	○	○	○	○	○	○

	How much did you agree or disagree with the following statement BEFORE you participated in ${e://Field/ExternalDataReference}?					How mu following ${e:
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree
I enjoy mathematics	○	○	○	○	○	○
I am good at mathematics	○	○	○	○	○	○
I have been recognized for my work in mathematics	○	○	○	○	○	○
I know how to apply to graduate school in the mathematical sciences	○	○	○	○	○	○
I am interested in continuing in mathematics	○	○	○	○	○	○
I want to be a mathematician	○	○	○	○	○	○

Please tell me how much you agree with following statements BEFORE and AFTER you attended ${e://Field/ExternalDataReference} programming . . .

	How much did you agreed or disagree with the following statement BEFORE ${e://Field/ExternalDataReference}?					How much did you agreed or dis statement AFTER you ${e://Field/ExternalDat		
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree	Disagree	Neither nor disa
Careers in academia in mathematics will allow me to balance work, family, and leisure	○	○	○	○	○	○	○	○
Careers in industry in mathematics (private or public non-profit/government) will allow me to balance work, family, and leisure	○	○	○	○	○	○	○	○

	How much did you agreed or disagree with the following statement BEFORE ${e://Field/ExternalDataReference}?					How much did you agreed or dis statement AFTER you ${e://Field/ExternalDat		
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Strongly disagree	Disagree	Neither nor disa
There are barriers to women and people who belong to other underrepresented minority groups in mathematics	○	○	○	○	○	○	○	○
The mathematics community is inclusive of people who belong to race/ethnic groups historically underrepresented in mathematics	○	○	○	○	○	○	○	○
The mathematics community is inclusive to people who are low income	○	○	○	○	○	○	○	○
The mathematics community is inclusive to women	○	○	○	○	○	○	○	○

Please describe how your participation in ${e://Field/ExternalDataReference} programming influenced your likelihood of doing the following?

	I had already done this before attending this program	What likelihood did you have of doing the following BEFORE you participated in ${e://Field/ExternalDataReference}?				What likelihood d following AFTE ${e://Field/Exte	
		Unlikely	Somewhat likely	Likely	Very likely	Unlikely	Somewha

		What likelihood did you have of doing the following BEFORE you participated in ${e://Field/ExternalDataReference}?				What likelihood d following AFTE ${e://Field/Exte	
	I had already done this before attending this program	Unlikely	Somewhat likely	Likely	Very likely	Unlikely	Somewha
Enroll in more classes in the mathematical sciences	○	○	○	○	○	○	○
Ask a peer for advice on applying to graduate school in the mathematical sciences	○	○	○	○	○	○	○
Ask a professor for advice on applying to graduate school in the mathematical sciences	○	○	○	○	○	○	○
Attend graduate school in the mathematical sciences	○	○	○	○	○	○	○
Pursue a career in industry in the mathematical sciences	○	○	○	○	○	○	○
Pursue a career in academia doing research in the mathematical sciences	○	○	○	○	○	○	○

	I had already done this before attending this program	What likelihood did you have of doing the following BEFORE you participated in ${e://Field/ExternalDataReference}? Unlikely	Somewhat likely	Likely	Very likely	What likelihood d following AFTE ${e://Field/Exte Unlikely	Somewha
Pursue a career teaching K-12 in the mathematical sciences	○	○	○	○	○	○	○
Pursue a career teaching in higher education in the mathematical sciences	○	○	○	○	○	○	○

Post-test specific Undergrad

How did your experience in the ${e://Field/ExternalDataReference} influence your likelihood of choosing to pursue an advanced degree in the mathematical sciences?

- ○ Greatly Increased
- ○ Somewhat Increased
- ○ No effect
- ○ Somewhat Decreased
- ○ Greatly Decreased
- ○ Not Applicable

How important were your peer interactions at ${e://Field/ExternalDataReference} in influencing you to pursue an advanced degree in the mathematical sciences?

- ○ Very Important

- Somewhat Important
- Not very Important
- Not at all important
- Not Applicable

How important were the mentors or role models that you identified in

${e://Field/ExternalDataReference} in influencing you to pursue an advanced degree in the mathematical sciences?

- Very Important
- Somewhat Important
- Not very Important
- Not at all important
- Not Applicable

Did the content that you learned in ${e://Field/ExternalDataReference} help you in your undergraduate coursework?

- The content I learned help me a lot
- The content I learned help me a little
- The content I learned didn't help me at all
- Not Applicable

Has your experience in ${e://Field/ExternalDataReference} helped you, or do you believe it will help you, with your graduate school application process?

- It made/will make the graduate school application process easier
- it didn't/won't have an effect
- It made/will make the graduate school application process harder
- Not Applicable

Graduate School Post-test

How did your experience in ${e://Field/ExternalDataReference} influence your motivation to continue with your graduate degree coursework ?

- Greatly Increased
- Increased
- No effect/I would have continued regardless
- Decreased
- Greatly Decreased
- Not Applicable

Did the content that you learned in ${e://Field/ExternalDataReference} help you in your graduate coursework?

- The content I learned help me a lot
- The content I learned help me a little
- The content I learned didn't help me at all
- Not Applicable

How important were your peer interactions at ${e://Field/ExternalDataReference} in motivating you to persist in your graduate school coursework?

- Very Important
- Important
- Somewhat Important
- Not at all important
- Not Applicable

How important are the mentors or role modelds that you made in

${e://Field/ExternalDataReference} in motivating you to persist in your graduate coursework?

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important
- Not applicable

Did you have a research experience through your participation in ${e://Field/ExternalDataReference}?

- Yes
- Maybe
- No

How important were any research experiences you had in ${e://Field/ExternalDataReference} in motivating you to persist in graduate school?

- It made me much more likely to persist
- it made made me somewhat more likely to persist
- It had no impact
- It made me somewhat less likely to persist
- It made me much less likely to persist

What overall effect has participating in ${e://Field/ExternalDataReference} had on your successful completion of your graduate degree?

- It made me much more likely to successfully complete my graduate degree
- It made me somewhat more likely to successfully complete my graduate degree
- It had no impact
- It made me somewhat less likely to successfully complete my graduate degree
- It made me much less likely to successfully complete my graduate degree

Final

Did you serve in a formal role (e.g. as a mentor, study group leader, etc.) to other participants as part of ${e://Field/ExternalDataReference}?

- ○ Yes
- ○ Maybe
- ○ No

How important was your experience as a mentor in

${e://Field/ExternalDataReference} in . . .

	Not at all important	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences	○	○	○	○	○
lowering your confidence in the mathematical sciences	○	○	○	○	○
identifying as a math person	○	○	○	○	○
motivating you to persist in future coursework in the mathematical sciences	○	○	○	○	○
motivating you to persist in other STEM fields	○	○	○	○	○
motivating you to pursue a career in K-12 mathematics education	○	○	○	○	○
motivating you to pursue a career in research in the mathematical sciences	○	○	○	○	○

Did you present at a conference as part of your participation in

${e://Field/ExternalDataReference}?

- ○ Yes
- ○ Maybe
- ○ No

How important was your experience presenting at a conference at

${e://Field/ExternalDataReference} in . . .

	Not at all important	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences	○	○	○	○	○
lowering your confidence in the mathematical sciences	○	○	○	○	○
identifying as a math person	○	○	○	○	○
motivating you to persist in future coursework in the mathematical sciences	○	○	○	○	○
motivating you to persist in other STEM fields	○	○	○	○	○
motivating you to pursue a career in K-12 mathematics education	○	○	○	○	○
motivating you to pursue a career in research in the mathematical sciences	○	○	○	○	○

Did you learn about barriers to participation in math and science for persons who belong to underrepresented groups in math and science (e.g. women, people of color, low income, rural, disability, etc.) as part of your participation in

${e://Field/ExternalDataReference}?

- Yes
- Maybe
- No

How important was the information that you learned about barriers to participation in math and science for persons who belong to underrepresented groups in math and science (e.g. women, people of color, low income, rural, disability, etc.) in . . .

	Not at all important	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences					
lowering your confidence in the mathematical sciences					
identifying as a math person					
motivating you to persist in future coursework in the mathematical sciences					
motivating you to persist in other STEM fields					
motivating you to pursue a career in K-12 mathematics education					
motivating you to pursue a career in research in the mathematical sciences					

Did you learn about implicit biases, stereotype threat or discrimination within the mathematical sciences as part of your participation in

${e://Field/ExternalDataReference}?

- Yes

- Maybe
- No

How important was the information that you learned about implicit biases, stereotype threat or discrimination within the mathematical sciences in . . .

	Not at all important	Somewhat important	No effect	Important	Very Important
increasing your confidence in the mathematical sciences	○	○	○	○	○
lowering your confidence in the mathematical sciences	○	○	○	○	○
identifying as a mathematics person	○	○	○	○	○
motivating you to persist in future coursework in the mathematical sciences	○	○	○	○	○
motivating you to persist in other STEM fields	○	○	○	○	○
motivating you to pursue a career in K-12 mathematics education	○	○	○	○	○
motivating you to pursue a career in research in the mathematical sciences	○	○	○	○	○

How much did your experience of the mathematics content at

${e://Field/ExternalDataReference} affect your confidence in your mathematics ability?

- Increased my confidence a lot
- Increased my confidence a little
- Did not affect my confidence
- Decreased my confidence a little
- Decreased my confidence a lot

Please describe in what ways, if any, ${e://Field/ExternalDataReference} had an impact on your future career aspirations?

Please describe any program elements or experiences that you found particularly meaningful or that had a positive impact on your life more generally?

Please describe any program elements or experiences that you would change to improve ${e://Field/ExternalDataReference}?

Demographics

What is your birthday? (mm/dd/yyyy)

What is the zip code where you live for most of the year?

Would you say the neighborhood you grew up in was . . .

- ○ Urban
- ○ Suburban
- ○ Rural

Did at least one of your parent(s)/guardian(s) earn a four year college degree?

- ○ Yes
- ○ No
- ○ I don't know

Are you Spanish, Hispanic, or Latino?

- ○ Yes
- ○ No

Choose one or more races that you consider yourself to be:

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Other

What best describes your gender?

- ○ Male
- ○ Female
- ○

What is your sexual orientation?

- ○ asexual
- ○ bisexual
- ○ gay/lesbian
- ○ heterosexual/straight
- ○ queer
- ○ _____

Are you now married, widowed, divorced, separated or never married?

- ○ Married (living together)
- ○ Married (living apart)
- ○ Not married, but living with a partner (Cohabiting)
- ○ Widowed
- ○ Divorced
- ○ Separated
- ○ Never Married

Do you have any children?

- ○ Yes
- ○ No

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Appendix C: Stakeholder Interview Questionnaire

1. How big of a problem, if at all, is it that there is an underrepresentation of women and individuals from other historically underrepresented groups with advanced degrees in the mathematical sciences as a whole?

If yes, problem:

a. Please describe your perceptions of the nature of the problem of underrepresentation of women and others from historically underrepresented groups with advanced degrees in the mathematical sciences.

b. What types of solutions do you think will broaden participation?

2. What are you doing now, or what have you done in the past, if anything, to actively increase the number of women and individuals from underrepresented groups headed to graduate school in the mathematical sciences or STEM more broadly?

a. What resources, if any, would facilitate your activities?

Prompt: identifying partners, funding, time, infrastructure, technology, technical assistance.

3. What are you doing now, or what have you done in the past, if anything, to increase the success of women and URMs who are in graduate school in the mathematical sciences or STEM more broadly?

a. What resources, if any, would facilitate your activities?

Prompt: identifying partners, funding, time, infrastructure, technology, technical assistance, professional development.

4. How familiar are you with programs aimed at women and other underrepresented groups that aim to increase participation?

a. Do you think these types of programs are effective at recruiting and retaining women and other underrepresented groups in the mathematical sciences? Why or why not?

5. Describe any benefits you think there are in implementing programs, conferences, or retreats aimed at increasing women's and other underrepresented groups' representation in mathematics.

6. Describe any risks or costs associated with programs, conferences, or retreats aimed at increasing women's and other underrepresented groups' representation in mathematics.

7. Are there any programs for women in math you would like to see created?

a. If yes, please describe these programs.

8. How would we be better able to discern the effectiveness of these programs?

9. In what ways, if any, do you see the national stakeholders within the mathematical sciences working together to increase participation of women and underrepresented groups in mathematics?

10. What are the barriers to the national stakeholders within the mathematical sciences in coming together and investing resources in programs aimed at broadening participation of women in mathematics?

Probes: Barriers to undergraduate and graduate programs, Barriers to societies within mathematical sciences, Barriers to programs (post-bacc, summer, conferences) aimed at women and other underrepresented groups in the mathematical sciences?

11. What would help facilitate more effective collaboration to overcome these barriers?
    a. Probes: identifying partners, funding, time, infrastructure, technology, technical assistance, a backbone organization.