

# Executive Summary

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## Summative Findings of the NSF PAID ADVANCE Horizontal Mentoring Alliances Initiative External Evaluation: Final Report

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### **Introduction**

This executive summary provides final, summative results for the external evaluation of the NSF PAID-ADVANCE initiative, “Horizontal Mentoring Alliances to Enhance the Academic Careers of Senior Women Scientists at Liberal Arts Institutions” based on comprehensive analysis of in-depth qualitative baseline and summative interviews exploring the major benefits and outcomes emerging from this innovative mentoring initiative.

This initiative was designed to provide alliance members opportunities to: network with senior women science faculty in liberal arts institutions; participate in career development discussions and workshops aimed at enhancing leadership, visibility, and recognition on their campuses and in the broader academic community; and develop mentoring paradigms that can be used on their own campuses with students, junior female faculty colleagues, and other senior female faculty colleagues, among other benefits. In the first phase of the external evaluation, the goal was to gather baseline data from the participants regarding their: career, institutional context, motivations for participating in the initiative, and satisfaction with early stages of participation. It was also an objective of the baseline interviews to determine initial successes of the initiative, as well as to provide formative feedback for future program improvement. Summative interviews explored outcomes of participation and the processes by which these accrued, probed views of replicability and sustainability of this mentoring model, and gathered information about “what works” (or not). The summative interviews also investigated participants’ opinions about the overall value of this initiative.

## Study Design

A mixed-methods research-with evaluation study was developed in collaboration with the initiative's Principal Investigators Drs. Kerry Karukstis (Harvey Mudd College) and Bridget Gourley (DePauw University), and the External Evaluator, Anne-Barrie Hunter (Co-director, Ethnography & Evaluation Research, University of Colorado-Boulder). All interview protocols and the study design overall, were submitted for review and approved by Harvey Mudd College's Institutional Review Board, to ensure that the study met high ethical, professional and legal standards for research involving human subjects. At the end of the first year of the initiative, in-depth interviews with participants were conducted with seven Alliance members during the New Orleans American Chemical Society (ACS) meeting April-5<sup>th</sup>-7<sup>th</sup>, 2008. Four Alliance members subsequently submitted written responses to the interview questions. Across Alliances 1, 2 and 3, qualitative interview data was collected from 11 of the 15 members (73%). All baseline informants are in chemistry.

Baseline interviewees (and those providing written responses) were asked to describe their career objectives and experiences and to comment on their experiences and attitudes regarding their current position and context. Alliance members were then asked their views about their motivations for participating in the Horizontal Mentoring Alliance, to describe what they understood to be the objectives of the initiative, their experiences of participating, and any benefits and outcomes (or not) of participating. As well, participants were asked their initial views regarding the efficacy and relevancy of the structural model (i.e., horizontal vs. vertical mentoring) in practice, their thoughts about barriers and supports to using this model, its sustainability, and for whom it might be usefully replicated.

Two years later, toward the very end of the project, summative interviews were conducted with the original 15 participants, as well as five senior women physicists who began their engagement later in the project.<sup>1</sup> Final in-person interviews were conducted with seven individuals during the ACS Spring 2010 National Meeting & Exposition, March 21-25, 2010, and the remaining 13 interviews were conducted by telephone March 26-April 30, 2010. Summative interviews focused on determining the major outcomes from project participation. These final interviews particularly probed the importance of the perceived benefits, views concerning the replicability and sustainability of this type of mentoring model, and best advice for future iterations of this initiative. Participants were also asked to summarize whether and how participation in a Horizontal Mentoring Alliance was valuable. Finally, they were asked what was most important to them about having participated and what they would have me, the external program evaluator, "tell the NSF" about this initiative.

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<sup>1</sup> At the time of the baseline interviews, the senior women physicists had not yet met together as a group.

## Method of Qualitative Analysis

Qualitative research methods are particularly useful in studying areas where existing knowledge is limited. Using careful sampling, qualitative data (i.e., in-depth interviews and open-ended survey questions) ground findings in the accounts, experiences, and explanations offered by those who are best situated to address the subject being studied. Careful analysis of such data can uncover, explore, and estimate the significance of issues that shape informants' thinking and actions. Through consistent coding, and modern software, ethnographers can disentangle patterns in very large qualitative data sets.

Transcribed baseline interviews, as well as written responses, were entered individually into text files and then imported into *NVivo 8.0*, a computer software program used in qualitative analysis. Summative interviews were similarly transcribed, saved as text files, and entered into the updated version of the software program, *NVivo 9.0*. The entire project was then updated to *NVivo 10.0* during the analyses of the data.

Using a qualitative research method, a content analysis of each of the data sets was conducted to identify attitudes, behaviors, and the range of activities that alliance members described concerning their participation in the Horizontal Mentoring Alliances initiative. In conducting an in-depth content analysis, text segments referencing distinct ideas are tagged by code names. Codes are not preconceived, but empirical: each new code marks a discrete idea not previously raised.

Using *Nvivo*, codes and their associated text passages were linked, amassing a set of codes and their frequency of use across the data set. When coding of the qualitative data was completed, codes similar in nature were grouped together to define themes. These clustered frequencies, represented as grouped themes, or "parent" categories, describe the content, range and relative weighting of issues in participants' collective report. The qualitative findings thus provide detailed and grounded evidence for evaluating the efficacy of the initiative. Evaluation and research findings from these qualitative data are strong because of complete participation by all Alliance members.

## Overview of Qualitative Findings

In all, 354 codes were developed to capture the content of the baseline interviews. The qualitative analysis of the baseline interviews revealed a total of 27 "parent" or thematic categories; there were 15 major categories. The 15 major categories reflect participant responses relevant to answering questions central to the evaluation. Remaining participant comments sorted into 12 minor categories, capturing a broad range of responses which were not specifically informative to the evaluation. An additional 323 codes were developed to capture content from the summative interviews, for a total of 677 codes, overall. The content analysis of the summative interviews produced one additional parent category (e.g., "*Gains: NO gain, but*

*absence of gain NOT due to Horizontal Mentoring Alliances*”) for a total of 16 “major” parent categories; no new “minor” parent categories were developed. In the baseline interviews, the major categories account for 73% of all participant observations; in summative interviews, they account for 90% of all participant observations.

In line with objectives of the external evaluation, baseline and summative interviews emphasized discovery of different information. Baseline interviews sought to find out motivations for participating, descriptions of individuals’ academic contexts, identification of senior women science faculty’s difficulties within liberal arts colleges, initial benefits and advice, etc. Summative interviews looked for a full account of outcomes, the importance participants’ assigned to these benefits, and issues of replicability and sustainability, which are of particular interest to the National Science Foundation and the PAID ADVANCE program.

The proportion of discussion across the various categories was similar among both sets of interviews. However, individuals in summative interviews offered nearly twice the number of observations concerning their gains from participation as did individuals in baseline interviews. Thus, final results show that summative informants’ commentary highlights greater gains made from participation (39% of summative observations vs. 27% of baseline observations) and their views on replicating and sustaining this type of mentoring initiative (17% of summative observations vs. 4% of baseline observations). Summative interviewees’ responses also appear to have been more focused, with a fewer number of comments comprising the “miscellaneous” category (just 10% of summative observations vs. 27% of baseline observations).

In presenting findings, I provide counts of discrete observations, as well as the number of sources citing those observations. Overall, the categories and numbers of observations provide the range of issues and relative weighting of opinion. However, the number of speakers is a better measure of the distribution of views on a particular topic. Thus I use both counts of observations, as well as of individual sources, in presenting findings in this report.

Next, I present findings from the major categories identified in the content analyses of the baseline and summative interview data, followed by a summary and conclusions to be drawn from results of this study. In the following discussion, I borrow from my previous report on the qualitative findings of the baseline interviews to compare and contrast findings from the summative interviews so as to capture a full picture of participants’ views and experiences for this external evaluation. Quotations are provided to illustrate the qualitative findings. Care has been taken in the selection of quotations so that there is fair representation of all participants. No attribution is given to protect anonymity.

## **Findings of the Major Categories for the Baseline and Summative Interviews**

### **Motivations to Participate**

One percent of all participants' observations discussed motivations to participate (23 baseline observations; 10 summative observations).

Members were primarily motivated to participate in the Horizontal Mentoring Alliances as a means to network and receive advice from other senior women science faculty. Several individuals mentioned other reasons to participate, including the desire to mentor women faculty, as well as the opportunity to extend their professional circle, while also reaching beyond the commonly-felt isolation of working at rural liberal arts colleges. Most of the summative observations repeated baseline observations. In summative interviews, a few individuals noted they were quite hesitant to participate, but, in the end, emphasized that they were very glad they did. A couple individuals acknowledged that a sense of obligation had motivated their participation. Overall, individuals' motivations for participating in the Horizontal Mentoring Alliances show that the participation in the initiative was seen as a way to fill various types of gaps existing in these senior women science faculty members' professional and personal lives.

### **Career Satisfaction**

Two percent of all participants' observations concerned career satisfaction (22 baseline observations; 23 summative observations).

As noted in the baseline interview report, nine Alliance participants were happy with their institutional context; two were not and were actively looking for and scouting out opportunities to "jump ship." The majority was happy with the liberal arts college context, generally, and liked the balance between research and teaching and the opportunity to work one-on-one with students that liberal arts colleges afforded them. One participant, while offering a positive comment about her job satisfaction, also noted that she "felt beaten down" by the male-dominated department.

Summative interview observations largely repeated participants' baseline observations. As in baseline interviews, the largest numbers of observations mentioned participants' career satisfaction, that participants were: happy with their institution and career context; happy with their job as a teacher; happy working at a liberal arts college with a good balance between teaching and research; and happy working one-on-one with students. A new type of observation offered in the summative interviews shows that at least one member developed a greater appreciation for her own position having gained wider perspective on others' (worse) situations.

Overall, just under half of participants (45%) reported that they are happy with the career and institutional context and another 35% said they were very happy with their job.

## Mentoring

Five percent of all participants' observations discussed mentoring (43 baseline observations; 100 summative observations).

In the baseline interviews, nearly three-quarters of participants noted that no formal mentoring program existed when they were hired by their institution. Just over half of participants in the baseline interviews said that a mentoring program had been established at their institutions in the past five or six years. Two commented on a cultural injunction against mentoring at their institution, which considered it a form of "interfering in others' independence to do things as they saw fit." However, several individuals had experienced mentoring informally with varied degrees of success. Despite heavily male-dominated institutions, several also recalled, and were grateful for, colleagues who made a concerted effort to help them early on in their academic careers (both within and outside their departments).

Observations on mentoring in the summative interviews emphasized the dearth of effective mentoring at all levels of academe, offering a good number of comments about failed and ineffective mentoring programs for junior faculty. As senior women faculty, however, they most commonly noted that mentoring was non-existent "just when you needed it the most!" Just over half of participants (55%) expressed frustration at the lack of access to quality mentoring for senior faculty members. Two additional participants noted that there was no formal or informal mentoring for senior faculty, although there was for junior faculty. Three others said that they had felt at a loss as to what to do when promoted to full professor and really would have benefited from mentoring at that critical step in their professional life. Two participants who had recently moved into administrative positions received no training or mentoring at all: they were expected to "dive in." In all, 80% of participants observed a tremendous need for mentoring for senior faculty members.

In other types of summative interview observations, one quarter of alliance participants commented that mentoring was particularly valuable in preventing future problems, and thus quite helpful in applied practice. One quarter of alliance participants also noted that they had found a source of peer mentoring with a colleague in another department, outside of the sciences, or even from male colleagues. Twenty percent of alliance members in the summative interviews made special note that they were glad to be participating at a point when she found this type of mentoring to be especially timely. As in the baseline interviews, a large number of individual observations referenced attempted, failed, or ineffective departmental mentoring efforts directed at junior faculty.

## **Working at a Liberal Arts College vs. a Large Research University**

Five percent of all participant observations contrasted working at a liberal arts college vs a large research university (36 baseline observations; 93 summative observations).

Counting both baseline and summative observations, participants' top three observations that contrast working at a liberal arts colleges with a large research, or R1, institution account for over half of all comments in this category (57%). A majority of baseline participants (55%) pointed out that, at a liberal arts college, there were much higher expectations to do more things in more and unrelated areas and that faculty members were expected "to wear a lot of different hats"; in summative interviews, 75% of participants offered this observation, and, in total, 85% of Horizontal Mentoring Alliance members expressed this view. About one third of alliance members in the baseline interviews (36%) also noted that liberal arts colleges were commonly characterized as isolated in multiple ways: they were located in rural areas; women were a definite minority; and representation of socioeconomic status and racial and ethnic diversity was narrow and limited. In summative interviews, the number of individuals expressing this view doubled. In all, 70% of participants named isolation as an issue for senior women science faculty members working at liberal arts colleges. In addition, while only three participants in the baseline interviews commented that R1 faculty have more freedom than liberal arts faculty because there is less emphasis on students and teaching, and more on research, this type of observation was voiced by over half of alliance members in the summative interviews (55%). In these comments, participants also reference larger departments and the "publish and perish" imperative of R1s (which provides implicit permission for R1 faculty members to focus on their own careers): at a liberal arts college, departments are small, it is all about the students, and the institutional ethos is such that faculty members are expected to sacrifice themselves.

Four individuals noted that advancement in the liberal arts context is unusually limited: there simply weren't that many positions that came open, and most administrative positions were generally viewed as conferring negative status on women: no one wanted these jobs.

Overall, participants' observations contrasting work within the context of the liberal arts college with that of the large research university speak to the issues underlying participants' motivations to participate in this initiative: women faculty members' isolation, the added stress of having to fulfill multiple, varied roles within the institution and one's department, the difficulties of balancing demanding professional and personal responsibilities, and not having anyone to turn to for advice.

## **Institutional Context**

Comments regarding their institutional context were 45 of all participant observations (33 baseline observations; 88 summative observations).

The types of observations offered by participants in the summative interviews echoed those given by participants in the baseline interviews, but, in general, to an even greater degree. Just under half of participants (40%) in the baseline and summative interviews commented that their institutions were located in “a cultural backwater.” In addition, a similar percentage of alliance members (35%) characterized their institutional context as “very traditional, patriarchal, and male-dominated.”

They described a workplace in which traditional (i.e., outdated) norms defining a “serious scientist” dictated that faculty members lead a monastic-like life devoted to work, without outside interests or distractions (i.e., family responsibilities).

One fifth of participants also typified their institutions as “conservative”; another two participants said that they found the predominate attitude at their institution to be “very elitist.”

In line with their observations of working in traditionally male-dominated workplaces, one fifth of alliance members remarked that key or important decisions affecting their department were apt to be made “on the basketball court,” “in the gym” or “in the smoky faculty lounge over donuts and coffee,” and that you were “out if you don’t have kids.”

While several alliance members in both baseline and summative interviews credited their male colleagues with being supportive, such support was more or less mediocre: it did no harm, but it didn’t help much either. Overall, male faculty members were characterized as fairly oblivious to any of the issues that women faced as the usually lone female in their departments.

Working at heavily male-dominated institutions, it is not surprising that only a couple alliance participants claimed that women served in senior administrative positions at their institutions.

At one institution, the fact that there were women who held senior administrative positions did not serve to ameliorate the context for women science faculty at the department-level:

Overall, alliance participants described institutional contexts in which they were isolated, not only by gender and discipline, but geographically and culturally, as well. They also described institutions and departments that remained stubbornly traditional, conservative and male-dominated. While these views were commonly expressed in baseline interviews, alliance members emphasized these factors in summative interviews.

## **Departmental Context**

Comments about their departmental context were 4% of all participant observations (34 baseline observations; 70 summative observations).

A majority of baseline interview participants (64%) said that their departments were aware of their participation in the Horizontal Mentoring Alliance or that their departments were aware of

their participation, but they weren't emphasizing it much and keeping their involvement "low profile." While three mentioned that their chairs or other colleagues and administrators were curious about their work and asked questions, more commonly, their male peers showed little or no interest about the alliance, or, indeed, about any aspect of their professional work.

In summative interviews, 45% of participants commented that their department knew of their involvement.

In new types of summative observations, almost equal numbers of participants said that departments were providing faculty funds to travel to conferences and, alternatively, that, due to the downturn in the economy, departments were no longer providing travel funds, (6 vs. 7 participants).

Of note, four participants said that they did not feel their contributions were valued by the department. Another two stated that because the grant did not bring money into the department or directly benefit students, it wasn't valued by the department.

Overall, HMA participants did not describe any meaningful changes in their departments during the period of the initiative: things remained pretty much the same. For some, there might be a bright spot here or there, but, in general, the department was not seen as very welcoming.

## **Gender Issues**

Four percent of participants' observations mentioned issues related to gender (26 baseline observations; 54 summative observations).

Despite the fact that the very large majority of alliance participants were the first woman to be hired in their department, there was not a great number of issues specifically related to gender that they found troubling, though, by definition, gender issues quite clearly existed for them. In baseline interviews, a few participants commented that women tend to be less confident than their male colleagues. A few also had experienced the burden of being the only role model for women students: the "token mom trotted out at events." One participant, however, did not feel that she was singled out to be a role model for women students in science. A couple participants noted differences between women's and men's behaviors, with women characteristically described as being more considerate and conciliatory towards their colleagues and, saying "yes" when, really they would rather not.

Observations in summative interviews matched these same types of observations, but at nearly double the rate. The top two observations related to gender issues were descriptions of women as being less self-confident than men, in general, and highly-accomplished, intelligent women feeling themselves to be "imposters."

Moreover, participants added to their observations on ways in which women's behaviors differed from men's. As before, participants observed that women, more than men, tended to: have difficulty saying "no," consider other people's feelings first, and; be more helpful and conciliatory. In their summative comments, participants added other behaviors commonly exhibited by women; hiding or downplaying their accomplishments and shying away from the spotlight; being too patient, i.e., waiting last to speak up at a meeting, and; working harder and being more efficient with their time. Participants recognized that these behaviors often served to disadvantage women. Being in a Horizontal Mentoring Alliance participants learned to recognize these behaviors and give themselves permission to "take it easier on ourselves."

### **Horizontal Mentoring Alliance Meetings**

Comments on Horizontal Mentoring Alliance meetings were 4% of all participants' observations (53 baseline observations; 60 summative observations).

Generally, alliance participants said that they were in fairly regular communication with other members. In baseline interviews, just over 80% of alliance participants mentioned meeting periodically by phone with other members—particularly those who had established professional collaborations with other alliance members. Almost half said that they emailed on a regular basis. In response to specific questions, participants related the substance of their first meetings in which they: "talked non-stop all weekend"; reviewed CVs; established short- and long-term professional goals; and discussed teaching load and equity. A few pointed out that they set agendas and made sure that "business got done."

Observations in summative interviews were similar in character. In summative interviews, 90% of participants reported regular telephone (or Skype) sessions about every two weeks, including those who developed professional collaborations with other alliance members. Two groups said that they had met twice, two groups reported meeting three times, and two groups reported meeting four times. Not every group member was always able to make every group meeting and a few conceded this was an ideal they "had to let go of." A few reported that their alliance had not met online regularly, but felt that they were a strong group nonetheless. In general, group members were pleased with other group members' participation. The following quotations are representative of participants' observations of this type.

Overall, the HMA self-defined meeting structure and varied means of communication (email, online, in-person, etc.) worked well and enabled participants to stay connected.

## Gains from Participating in the Horizontal Mentoring Alliances

Alliance members strongly emphasized the benefits and outcomes from participating in the Horizontal Mentoring Alliances initiative. Indeed, participants' positive observations far outnumbered any other category of comments: in baseline interviews, gains comments were 27% of all participants' comments (n=207 observations,) and in summative interviews they were 35% of all comments offered (n=758 observations). Each participant in the baseline interviews offered an average of 19 observations on gains made from participation; while in summative interviews, each participant offered an average of 38 observations on gains from participation in the Horizontal Mentoring Alliance, indicating even greater appreciation for involvement in the mutual-mentoring initiative over time. Overall, in both baseline and summative interviews, the 20 Horizontal Mentoring Alliances participants offered nearly 1000 observations on the benefits they took away from their involvement in the initiative, or 48 gains observations each, on average.<sup>2</sup>

In stark comparison, numbers of observations regarding “gains not made,” “mixed or qualified gains” and “no gain, but absence of gain not due to the Horizontal Mentoring Alliances” were nominal: on average, 24 observations per type of observation, or an average of just over one type of observation each per participant.<sup>3</sup>

As is clear, participants' observations of gains from their involvement in the Horizontal Mentoring Alliances were overwhelmingly positive.

The 10 top gains from participation in the Horizontal Mentoring Alliance, which were described by 75%, or more, of participants, are largely “soft gains”—benefits which are hard to define and difficult or impossible to quantify, but which, participants' pointed out, speak to the very need for this type of mentoring and mentoring initiative:

- Group feels like equal peers; Shares advice, ideas; Interaction of women at similar levels; Genuine support; From professional to personal
- Outside viewpoint; Different perspective
- Learning to speak up for oneself; Accept due recognition; Ask for what one wants; Increased self-confidence

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<sup>2</sup> Personal note from the external evaluator: In my many years doing program evaluation, I have never encountered such a high average of gains' observations: reports of gains are double what I normally find reported for participant benefits.

<sup>3</sup> I will not discuss these findings since there are so few observations, overall. Those who are interested may find tables for the gains not made, mixed or qualified gains, and gains not made—absence of gain not due to HMA in Appendix B of the final report.

- Transfer to self, personal life: “I am so much better off now than before joining the Alliances”
- Seeing where she stands relative to women faculty at other institutions; What others have and vice versa; Comparisons by institution
- Transfer to women at own institution: Junior faculty, women students on own campus. Gave presentation; Some interest among women at institution; Organized small peer mentor groups to discuss book on women in academe
- Talking, socializing with other women; Time out, away from one's institution; Time to breathe
- Permission to focus on own professional development, long-term goals
- Relief of isolation

In addition, 50%, or more, of all Horizontal Mentoring Alliance members reported the following benefits from participation:

- Have become genuine friends; Will likely continue beyond alliance life; Organic life of its own
- Anonymity to address institutional issues without fear of compromising confidentiality
- New appreciation for importance of negotiating to get what one wants Raise awareness Being able to say NO
- HMA provides a different kind of mentoring you don't get anywhere else
- Addressing issues holistically From work to family Life is not compartmentalized
- Getting advice on stuff you didn't know you needed advice on Unexpected benefits
- Advice given worked in practice
- Participation in Alliance brings prestige Alliance members are highly respected Greater recognition from chair, own department regarding talents and contributions HMA participation respected Gives her cache with department
- Many of the gains are soft gains, Hard to document But this makes gains even more important
- New professional collaboration New, expanded networks
- Nothing to be gained from others success or failure Neutrality
- Transfer to department/institution: Deans, chairs ask for input regarding equity, how things are done at other institutions, etc. Of interest to male faculty at institution Issues for them too
- Relief from burn out Rejuvenated
- Lack of department politics, struggles, jealousies: provides great relief
- Women participating in the NSF PAID ADVANCE project have been really, really wonderful HMAs are great
- Always someone authoritative to go to for help and information even late at night

- Established short-, long-term goals to achieve Clarified what was important and of interest to her

Thus a majority of participants reported gains in being in a group of equal peers, interacting with other senior women science, faculty, sharing advice and alternative perspectives, feeling genuine support—from professional to the personal—and relief from isolation.

A majority of alliance members described how being part of the initiative had given participants: gains in confidence; more confidence to “speak up for myself” and ask for what they wanted from their departments; willingness to accept due recognition for their professional work and contributions, and permission to focus more time and attention on their professional goals.

A majority of alliance members also mentioned the benefits of building friendships that will last beyond the formal initiative; enjoying the opportunities to socialize with other women; getting away from their institutions and enjoying confidentiality and neutral ground, free from department and institutional politics. Seventy-five percent said that this is a valuable type of mentoring “you can’t get anywhere else.”

An important gains observations, 80% of participants commented, “I am so much better off now than before joining the Alliance,” and 60% said that they had “received many more benefits than I expected.”

A majority of alliance members noted how benefits from participation in the mutual-mentoring initiative transferred to their own institutions, departments, colleagues and students. In these types of observations, participants often emphasized the importance of “legitimacy” derived from the NSF’s sponsorship of the initiative.

Gaining broader perspective from other members’ experiences and given the opportunity to compare and contrast their situations with others’, in summative interviews, 90% of participants expressed greater appreciation for their own contexts. Many also expressed greater appreciation for the opportunity to participate in the initiative.

Some participants expressed the view that monies supporting the Horizontal Mentoring Alliance really are cost-effective as a means to support faculty retention. The money spent to support this type of faculty professional development would undoubtedly save the department and institution a good deal of money when compared to the expenses associated with recruiting, rehiring new faculty.

During the time of the initiative, alliance members experienced life-threatening illnesses, the death of a parent, the death of a spouse, and other serious, difficult and stressful challenges. For these individuals, participation in the mutual-mentoring initiative proved valuable in ways they could not have anticipated. The support and advice of their alliance members during a terrible time was sincerely appreciated.

In sum, Horizontal Mentoring Alliance members cited a very large number of benefits from their participation in the initiative. Dominant gains cited by a large majority of participants—including belonging to a of equals, sharing advice and ideas, and relief of isolation, among a range of other professional and personal benefits—shows the initiative has been very successful in meeting its project objectives.

### **Difficulties Encountered Participating in the Horizontal Mentoring Alliances**

Three percent of all members' comments mentioned difficulties encountered participating in the Horizontal Mentoring Alliances initiative (23 baseline observations; 58 summative observations).

Difficulties experienced by participants were balanced among three types:

- those related to issues of time;
- those associated with geography, and
- those associated with the group.

The most commonly mentioned difficulty was voiced during the summative interviews, where 55% of participants said that, because alliance members were from different sub-disciplines, they did not attend same professional conferences and this made it hard to coordinate meetings with each other. Often, issues of time and geography were raised simultaneously.

More general difficulties related to time and geography concerned the different time required for travel, particularly for those living in rural areas or for those with geographically-dispersed group members.

In other observations, alliance members' agreed that just finding time to participate had proved a difficulty. Smaller numbers of participants offered a few comments on a range of difficulties associated with time: taking time at weekends was hard on family; taking time during the academic year or during the summer was equally hard. About half of participants agreed that travel was more difficult from their rural liberal arts colleges and that it was difficult to coordinate travel across the US from their more remote locations. A few noted that scheduling conference calls across time zones was difficult.

In addition, it does appear that a few women (n=3) did not feel much in common with other alliance members and, at times, found it "hard to fit in." A few (n=3) also found that "some groups worked better than others" and that it took time for some groups to "coalesce."

A couple participants noted that one reason this initiative had been so valuable was that there were so few of them and they were so spread out that it was hard to find each other! In the end,

the main difficulty is that there are no other senior women faculty members in science out there: “We are it!”

### **Alliance Members’ Wants, Unmet Needs, and Advice to the Initiative**

Alliance members were asked to comment on what was missing from or could improve the initiative. In response, 19 participants provided 77 observations (18 baseline observations; 59 summative observations), constituting 3% of observations, overall.

Most commonly, participants said that having had more direction at the beginning would have been helpful. Forty percent of participants observed that more direction initially about “what we’re supposed to do” would have been useful.

The 40% of participants who commented on the adequacy of how often alliance members met expressed the view that it was an appropriate number of times. Members appreciated that the frequency with which they met was determined by the group.

However, a similar percentage of participants (35%) indicated that they wanted more opportunities to meet with their alliance, other alliances, as well as with all alliance members, as a whole:

One participant said she would like to have a list of all senior women science faculty nationally:

Overall, participants found few things wanting in the initiative. Their main advice was to provide greater structure at the outset: being “task-oriented,” alliance members felt more comfortable knowing they were “doing something.” While a number were happy with how often they met with their group and the other alliances, a similar number wanted more communication and more opportunities to meet together, particularly as a whole.

### **Replicating and Sustaining the Horizontal Mentoring Alliances Initiative**

Central to this initiative and the evaluation were research questions exploring the replicability and sustainability of the Horizontal Mentoring Alliances initiative—questions important to the NSF ADVANCE program, overall. To answer these questions, in interviews, the external evaluator asked participants to comment on what elements they saw as important or critical to making the initiative such a success. Participants were also asked to comment on what they saw as the main barriers to sustaining the initiative and suggest ways it might be sustained. The external evaluator also sought alliance members’ views on whether they thought the initiative could or should be replicated in other contexts and/or for other groups (e.g., in research-intensive universities for women science faculty, generally). Finally, participants were asked to reflect on their participation and to summarize what about the initiative was important and what the NSF should learn from this initiative. In responding to these questions, alliance members’ observations define “what works,” provide insights into how the model might most usefully be

replicated, answers for how such models should be effectively implemented, and thoughts on how such a mutual-mentoring model might be sustained. Participants' comments summarizing what about the initiative was important and what the NSF should learn from this initiative ("Tell the NSF...") address the overarching program evaluation question regarding the extent to which the initiative achieved its objectives. Multiple, independently-gathered observations serve to corroborate, complement and support participant accounts and provide evidence answering research questions regarding the utility of this type of mentoring model and its application in other contexts as an effective means to support, retain and advance the careers of women science faculty, that is, the overall objective of the Horizontal Mentoring Alliance initiative and the NSF ADVANCE program.

Observations comprising the "replicating and sustaining the Horizontal Mentoring Alliances" category were 17% of all summative interview observations, and 13% of all participant observations; indeed, in summative interviews, this category ranks second in number of observations, following participants' positive gains observations. While participants offered some observations on replicability and sustainability in the baseline interviews (n=31), they offered tenfold the amount in summative interviews (n=332). Though questions about replicability and sustainability were a focus of the summative interviews, these issues were important to the participants, and, as with all other questions, alliance members offered thoughtful, considered responses to questions on replicability, sustainability, and the larger outcomes of the Horizontal Mentoring Alliances project.

As these topics are highly interrelated and as observations explain and reinforce other comments, they are discussed together.

### **Replicability and sustainability**

The greatest barrier to sustaining the Horizontal Mentoring Alliances is funding to support the mentoring initiative: 60% of participants acknowledged that finding a funding source to pay for travel so that members could meet together was the single-most critical factor affecting alliance members' ability to replicating and sustaining such an initiative.

Forty percent of participants expressed the view that legitimacy was a factor affecting replicability and sustainability: since gender equity is still not seen as an important issue in many institutions and departments, the NSF's implementation of the ADVANCE program provides critical acknowledgement of issues affecting women science faculty's career satisfaction and advancement and gender equity in academe. In moving forward with future mutual-mentoring models like the HMA, participants were strong in the opinion that the backing of a prestigious organization would be necessary. Approaching professional organizations and associations (i.e., PKAL, GLCA, ACS, AAPT, The Mellon Foundation, NSF, etc.) were proposed as logical sponsors to help build a mutual-mentoring network with the cachet needed to provide the legitimacy necessary for the initiative to be successful.

One quarter of participants raised the time limitation of busy lives as factors affecting the replicability and sustainability of similar mentoring alliances.

One fifth of alliance participants suggested that, as an alternative to the Horizontal Mentoring Alliance, perhaps the NSF or other professional organization could pay travel and a small stipend and host two-day workshops where women could convene and talk about such career advancement issues, etc., face-to-face.

With legitimacy behind a mutual mentoring initiative, participants thought horizontal mentoring could be replicated in a variety of contexts, including research-extensive universities, non-élite liberal arts colleges, master's granting institutions, and community colleges, among others. They also saw it benefiting women in non-tenure-track careers, as well as adjuncts and post-docs, among others. Indeed, alliance members saw the mutual-mentoring model as beneficial for any marginalized group.

In particular, several participants felt there was a huge need for horizontal mentoring in small (non-élite) liberal arts colleges. Indeed, one member expressed the view that supporting faculty at these institutions was important to securing the education of a large number of future American scientists as it is in these small, but important institutions of higher education, where undergraduate talent is fostered and supported, enabling them to persist to graduation and go on to graduate study.

Some felt it could be replicated in any discipline.

In discussing replicating and sustaining mutual-mentoring networks, participants commented on the broader and longer-term outcomes of supporting such initiatives and the tremendous cost-to-benefits ratio of recruiting, hiring and paying new start-up costs to replace unhappy faculty who have left compared to paying for travel to a couple of meetings per year and retaining happy, satisfied faculty members.

Indeed, a couple participants suggested that departments should bear the costs of supporting this type of initiative as a strategy to retain women faculty members.

While some participants in baseline interviews expressed the view that this type of mentoring was most beneficial for women faculty later in their careers, in summative interviews, nearly an equal number thought that horizontal mentoring benefited women at any stage in their academic career.

Some alliance members said that this type of mentoring would be beneficial for junior faculty near to and just following their tenure review.

A few participants thought that horizontal mentoring could benefit men equally.

Others doubted that men struggled the same way that women did and did not think men would find horizontal mentoring beneficial, especially men at R1 institutions.

### What Works?

Participants identified elements critical to the initiative's success and offered observations regarding "what works." One quarter to half of all participants identified the following as important to making the horizontal mentoring alliances effective in practice:

- Meeting face-to-face several times the initial year created bonds that lasted without in-person contact
- A common basis at the nucleus, i.e., being at an LAC, all women, etc.
- Getting outside one's institution; getting outside perspective and safety at a distance
- Unstructured time and conversation; really important revelations have come out of spontaneous conversation; you can't plan for these outcomes, they emerge organically
- NSF credibility behind/funding HMA gives the project and participation important legitimacy (discussed above)
- Important to set aside designate time to deal with this stuff, otherwise there is no time and it gets lost in the shuffle
- Funding to pay for travel so that they can get together This has been HUGE (discussed above)

One fifth of participants offered the following types of observations on what worked to make the horizontal mentoring alliances such a successful initiative.

- Localism and individualized mentoring to address specific circumstances; freedom to define for own group what works
- Horizontal mentoring, lack of hierarchy, flat structure that is inclusive
- Regular ongoing communication between Alliance members for group cohesion; regularly scheduled phone, Skype meetings every two weeks kept group members accountable, connected
- Being made to eat together in order to get reimbursement: seemed silly at the time, but BRILLIANT in practice; eating together broke the ice, really got people talking, bonding
- Delicate balance between homogeneity and heterogeneity of the group

In general, participants' observations on "what works" speaks to the ways in which the PIs originally intended and structured the alliances to operate and that these intentions and structures were effective. That is, horizontal mentoring implemented in the manner proposed was effective. Given participants' formative feedback regarding their wants, unmet needs and advice to the initiative should suffice for implementing and improving future iterations of such a mentoring initiative.

Finally, at the end of summative interviews, the external evaluator asked participants to summarize their participation in the initiative and identify what was important the NSF learn from this initiative. Often, these “Tell the NSF” comments serve as overall evaluations of the initiative, highlighting the principal impetus of the initiative NSF ADVANCE program—the advancement of women science faculty—and significant outcomes of the Horizontal Mentoring Alliances.

Sixty-five percent of alliance participants would have the NSF know that this initiative was extremely valuable:

About one third of participants stated that money, itself, could not buy the gains they took away from participating in the initiative. Such “soft gains,” in fact, characterize the large majority of benefits reported by participants.

One participant noted that supporting senior women science faculty is important since they serve as role models to their students. She felt this was particularly true for women science faculty of color and students of color in science, technology, engineering and mathematics (STEM) majors.

One fifth of participants said that the initiative was effective in that alliance members reported gaining real practical and applied understanding of what leadership is about and, as such, was important in supporting the advancement of women in leadership roles and participation had helped to advance her career positively.

One participant would have the NSF know that it is precisely this type of initiative that, being effective and measured by both soft and hard gains, will work to change the very issues of interest to the NSF ADVANCE program: promoting the advancement and diversity of women science faculty.

The NSF has long acknowledged that there are benefits to research that go beyond narrowly defined intellectual milestones being reached, and they’ve always talked about the social impact of research, not always, but for the many years that I’ve seen grants reviewed. And so these principally socially impactful grants are not weird and special, they’re really part of the universe of grants, and part of the goals of any kind of grant that they give. It’s really heartening that the NSF has had this program where they’ve acknowledged that research comes from human beings, with human values and human needs, and people who have genders, and who have races, and that this is not just sort of a trivial aspect of the people who are doing the research, but this is an absolutely essential component to anyone who does research. They all have gender, they all have race, and they all have life situations particular to gender. So, the fact that the NSF acknowledges this thing that most people find absolutely, stunningly obvious, but scientists have this way of saying, “Well it doesn’t matter. We’re all brains in jars,” is very heartening. It does credit to the NSF that they acknowledge that people who do research are human, and that they need all kinds of supports that are beyond just a budget line for material and equipment in the lab. This is one of those great leaps forward, where they’ve really been visionary. This is what scientists need to keep doing good science. And in this case, people who teach in small colleges need to both keep teaching and keep turning out good science on the small college level. And, we want to be sure that those people don’t fade away and disappear,

and that the pendulum doesn't swing back and we missed our opportunity. White guys, who have a wife at home, who are doing all the science—we're really sure we don't want to go back to that. So we're going to ensure the health of the infrastructure, the human infrastructure, by keeping a program like this alive. It's absolutely essential to keep telling people, "You're people. We know you have human issues, And part of our funding mission is to help you resolve those issues and keep doing what you do well, which is produce scientists, in our case as a small college, produce amazing students who go on to grad school and enable things to get done. There's a lot to be had from the softer measures that come out of this type of an initiative that are extremely important, in terms of a professional development point of view. It has tremendous payback to the institution, well beyond the investment. Any little thing you can do to be family friendly, to be, o give people a break if they need a family leave or something...that pays back like ten-fold. If the costs of hiring a new person are inestimable, the cost of me retiring too early because I'm burned-out and forcing my school to search for a startup, you know, that's terrible. Replacing an experienced professor with a brand new one ...years, even decades before the experienced professor is maybe going to wind down and retire, that is just so costly for everyone concerned. Should you actually help save a woman, a woman of color in this job, you've totally changed the world. Again, I want to say that is where we need to be looking...to change the world in that way. (Summative interview)

## Summary and Conclusions

Members were primarily motivated to participate in the Horizontal Mentoring Alliance as a means to network and receive advice from other senior women science faculty. Several, however, mentioned other reasons to participate, including the desire to mentor women faculty, as well as the opportunity to extend their professional circle, while also reaching beyond the commonly-felt isolation of working at rural liberal arts colleges.

Overall, just under half of participants (45%) reported that they are happy with the career and institutional context and another 35% said they were very happy with their job. They appreciated the liberal arts context and working closely with students. However, two members were exploring the option of leaving their current position, and looked to their alliance for good advice on how they might move their career forward. Eighty percent of participants stated, "I am so much better off now than before joining the alliance" and 60% said that they had "received many more benefits than I expected." Given that participants reported no substantial changes at their institutions and departments during the time of the initiative, this gain is an important finding. Gaining broader perspective from other members' experiences and given the opportunity to compare and contrast their situations with others', in summative interviews, 90% of participants expressed greater appreciation for their own contexts. Many also expressed greater appreciation for the opportunity to participate in the initiative.

Nearly three-quarters of participants noted that no formal mentoring program existed when they were hired by their institution. Just over half said that a mentoring program had been recently established at their institutions. A couple alliance members commented on an institutional culture that discouraged mentoring of any kind, considering it improper interference in others' personal and professional lives. Several individuals had experienced informal mentoring with varied degrees of success. Despite heavily male-dominated institutions, several also recalled, and were grateful for, colleagues who made a concerted effort to help them early on in their academic careers. In summative, interviews, a majority of participants emphasized the importance of receiving good mentoring, at all stages of one's career. They noted, again, the particular gap in effective mentoring for senior women science faculty: in all, 80% of participants observed a tremendous need for mentoring for senior faculty members.

Participants made comparisons between working at a liberal arts college and a large research university. Most argued that the liberal arts context demanded more work in more and unrelated areas than expectations for faculty at large research universities. Too, a relatively common theme was the multiple ways in which liberal arts colleges tended toward isolation: they were located in remote locations; women faculty members were a definite minority, and socioeconomic status was fairly narrowly represented. Some expressed frustration at the limited opportunities for professional advancement: there simply weren't that many positions that came open and administrative positions were generally viewed as conferring negative status on women.

About half of participants commented that their institutions were "a cultural backwater," and though their male colleagues were credited with being supportive, in general, the quality of support was judged to be unenthusiastic, overall. Most male faculty colleagues didn't say much about anything one way or another, and they were characterized as largely oblivious to any of the issues that women faced as the (usually) lone female in their department. Participants noted that decision-making practices still tended toward "a good ol' boys" club, occurring "on the basketball court," "in the gym" or "in the smoky faculty lounge over donuts and coffee," without their input. Only a couple alliance participants said that women served in senior administrative positions at these male-dominated institutions.

A majority of participants said that their departments were aware of their participation in the Horizontal Mentoring Alliances. However, several pointed out that they were keeping their involvement "low profile." While a few mentioned that their department chairs or other colleagues and administrators were curious about their work with the initiative and asked questions, as noted previously, their male peers generally showed little or no interest in any aspect of their professional work.

Alliance members offered only a small number of comments specifically related to gender issues that were seen as problematic, despite the fact that the very large majority of Alliance participants were the first woman to be hired in their department. A few commented that women tend to be less confident than their male colleagues. A few also described years of being the only role model for women students in their department or of being the “token mom trotted out at events.” A couple participants noted ways in which women tended to cope with being the lone woman in science: working harder and being more considerate and conciliatory towards their colleagues.

Participants said that they were in fairly regular communication with other members by phone and email. Some also mentioned using electronic networking and conferencing software, including Sakai, whiteboards, Merratech and Skype. Almost all described their first meeting as “talking non-stop all weekend.” They reviewed CVs, established short- and long-term professional goals, and discussed teaching load and equity. Initial face-to-face meetings enabled Alliance members to establish the bonds of trust and friendship that carried over and enabled future support given at a distance.

Alliance members strongly emphasized the benefits and outcomes they had taken away from participating in the Horizontal Mentoring Alliance. Indeed, participants’ positive observations far outnumbered any other category of comments. Alliance members detailed a wide range of gains, but most commonly described the benefits of: sharing and receiving advice and support among a group of peers; increased confidence to speak up for oneself and accept due recognition for professional work and contributions; permission to focus on one’s professional goals and development; making genuine friendships that would last beyond the life of the initiative; the transfer of gains and lessons learned to their own institutions, departments and students; and, of course, relief of their isolation. Smaller numbers of alliance participants offered fewer numbers of comments on a variety of gains, such as opportunities for professional collaboration and the opportunity to expand professional interests, among others. In strong contrast, participants offered only a handful of comments that indicated a gain had not been made, or that the gain was “mixed,” or qualified in some manner.

Alliance members offered very few observations regarding difficulties encountered in participating in the initiative. Problems were primarily due to time, geography or group cohesion, though technology issues posed difficulties for a few.

Alliance members offered similarly few observations regarding their wants, unmet needs and advice for improving future iterations of the Horizontal Mentoring Alliances initiative. Primarily, participants recommended providing more direction at the start to better define alliance members’ roles and suggested topics for exploration. Being “task oriented,” participants

often struggled with the open-endedness of meetings, but ultimately cited the organic, unstructured time, as being the time in which the benefits of horizontal, peer mentoring occurred.

Alliance members saw the Horizontal Mentoring Alliance mentoring model as highly replicable in a variety of contexts, as well as for any group that finds itself marginalized. Similar mutual peer mentoring alliances could well be applied to research universities and master's granting institutions, to community colleges, among other contexts. Participants expressed the view that not only did senior women science faculty benefit from this type of initiative, but so would women at any stage or position in their academic career. While some participants expressed the view that men at liberal arts colleges might benefit from mutual mentoring, generally, speaking, it was believed that men would not benefit from participation in the same ways that women did.

Overall, results from the analysis of the baseline and summative qualitative interviews with participants indicate that the Horizontal Mentoring Alliances initiative has been highly successful in meeting its objectives and in answering questions to the proposed research questions on replicability and sustainability. From alliance members' observations, it is clear that the initiative was highly effective in providing participants opportunities to: exchange experiences and ideas with and receive advice from and network with other senior women science faculty in liberal arts institutions; engage in career development discussions aimed at enhancing leadership, visibility, and recognition on their campuses and in the broader academic community, and, ultimately, led to the personal and professional advancement of these senior women science faculty—achieving the goals of the NSF ADVANCE program.