Grant Writing Bootcamp: 

An Intervention to Enhance the Research Capacity of Academic Women in STEM

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Abstract

Broadening the participation of women in science, technology, engineering, and mathematical (STEM) fields is more than a social justice issue; diversity is paramount to a thriving national research agenda. However, women face several obstacles to fully actualizing their research potential. Enhancing the research capacity and opportunity of women faculty requires purposeful changes in university practice. Therefore, we designed an intervention, a Grant Writing Bootcamp informed by Self Determination Theory (Deci and Ryan 2012), designed to support participants’ feelings of relatedness, autonomy, and competence. Three Grant Writing Bootcamps were run over an 18-month period. Using a pre-posttest design over the span of one year (and contrasting results with a comparison sample who were not part of the intervention) showed women participating in Grant Writing Bootcamp significantly increased the number of external grants submitted, number of proposals led as PI, number of external grants awarded, and amount of external funding dollars awarded.

**Key words:** Women in STEM, Self Determination Theory, Intervention, Grant Writing, Behavioral Science
Introduction

There is no doubt women are numerically underrepresented as academic researchers in most science, technology, engineering and mathematics (STEM) fields (Corbett and Hill 2015, National Science Foundation 2014), and that the working environment can feel unwelcoming to those women who do persist in academia (e.g., Corbett and Hill 2015, Fox 2015, Holleran et al. 2011). Broadening the participation of women faculty in STEM fields is more than a social justice issue; diversity within STEM is paramount to the future of a thriving and innovative national research and economic agenda (Harding 2015, Hong and Page 2004, Intemann 2009, Riley 2008, Thoman et al. 2015). Case in point: the Chief Officer for Scientific Workforce Diversity and the Director of the National Institutes of Health noted that a lack of diversity in the science research workforce is “limiting the promise of our biomedical enterprise for building knowledge and improving the nation’s health” (Valantine and Collins 2015). If we wish to maximize innovation and discovery, we must go beyond the hard and important task of adding more women researchers to the academic mix (Etzkowitz et al. 1994, Mitchneck, Smith, and Latimer 2016, Smith et al. 2015) and also focus efforts on supporting diverse talent by growing women faculty members’ research capacity and opportunity for securing external research funding.

Women faculty face several obstacles to receiving external research funding. Compared to men, women hold fewer prestigious post-doctoral positions (Sheltzer and Smith 2014), are allocated less in institutional start-up resources (Sege, Nykiel-Bub, and
Selk 2015), are given less credit for their contributions in team-science collaborations (Torres 2016), and are cited less frequently than equally positioned male authors (Larivière et al. 2013, West et al. 2013). In addition, women face extreme service-workload obligations in higher education (Misra et al. 2011). What is more, women more than men, contend with gender-related modesty and communal norms that dictate expectations to avoid negotiations that would further their own interests and instead place others’ needs and resources first (West et al. 2013). All of these issues combined with factors external to the institution, such as the strong likelihood that women share a disproportionate ratio of domestic and caregiving duties and may not have strong familial or social support for their careers (Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering 2007, Deutsch and Yao 2014), unduly impact women’s grant writing productivity and grant success. Changes in university policy, practice, structure and culture are required to abet women faculty in writing successful grant proposals (Easterly and Pemberton 2008, Xu 2008).

Setting aside for a moment the hotly debated notion that gender discrimination still exists within grant reviews and panels (Lee and Ellemers, 2015, Marsh et. al. 2009, Mutz, Bornmann and Daniel 2012; see also Kaatz et al. 2016), what is not debated is that women in STEM receive less funding than men (e.g., Boyle et al. 2015). For example, as reported in the National Academies Report, (Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering 2007), only 24% of R01s (large, five-year research grants) awarded in 2004 by the National Institutes of Health (NIH) were awarded to women, and that when awarded, women faculty received less funding than men, especially for center grants. At State University Name a decade after
that report, the data told a similar story: Since 2010, our State University received 2,332 grants, with 26.2% awarded to women, yet the overall percentage of women faculty ranged from 32.2% (FY10) to 37.3% (FY14). Only 21% of grants that were funded at our State University in FY14 had a woman faculty listed as the principal investigator (PI), and the average funding women faculty received was less than a quarter of what their male counterparts received.

What can we do to intervene to increase grant-funded research among women faculty in STEM and in turn bolster the future scientific research within the academy? There is very little published literature testing the efficacy of faculty grant writing education on grant writing success in STEM or other fields. One exception by (Frantz 2013), described the process of developing two faculty learning communities (FLC) focused on grant proposal development. Anecdotal evidence from those FLC participants was positive and the author reported that three out of five participants in one of the FLCs submitted grants, though all grant submissions were to internal funding opportunities (and none submitted from the other FLC). The goal of this study was to test the impact of a theory-informed Grant Writing Bootcamp (aka “Bootcamp”) aimed at improving the submission rate and funding success of women faculty in STEM.

**Self-Determination Theory**

The design of Bootcamp was informed by Self-Determination Theory (SDT, Deci and Ryan 2000). SDT states that when a task, event, or job is experienced as “self-determined” (as opposed to controlling), the experience is engaging and fulfilling (Deci and Ryan 2012). To create a self-determined context, the theory goes on to posit, people must feel a sense of choice, efficacy, and a meaningful connections with others, which
are the three psychological nutrients (*relatedness, autonomy*, and *competence*) needed for cultivating a self-determined environment (Deci and Ryan 2000, 2012). *Autonomy* is the experience of control, flexibility, and volition; *competence* is the experience of effectiveness and mastery; *relatedness* is the experience of connection, caring, and involvement with other people (Deci and Ryan 2012). The literature is replete with data supporting the hypothesis that, when these three psychological needs are satisfied, positive outcomes ensue (e.g., Levy and Cardinal 2004, Ng et al. 2012). For example, in a study of professional nurses, the more the workplace satisfied these three psychological needs, the lower were reports of workplace exhaustion and cynicism (i.e., burnout) and the lower were turnover intentions (Trépanier, Fernet, and Austin 2015). Indeed, the negative impact of work pressures are mitigated when employees feel that their workplace supported their autonomy, relatedness, and competence needs (Van den Broeck et al. 2008). Parents, teachers, supervisors, and significant others can satisfy (or thwart) people’s needs for autonomy, relatedness, and competence (Deci and Ryan 2012, Niemiec and Ryan 2009) in a wide variety of domains (Milyavskaya and Koestner 2011).

Self Determination Theory is useful for designing interventions to cultivate optimal learning (Niemiec and Ryan 2009) and change behavioral norms (Williams et al. 2006). As one example, the faculty search process at one university was redesigned using SDT to support the search committee’s needs for autonomy, competence, and relatedness around conducting a broad and inclusive search for diverse faculty (Smith et al. 2015). Results from the randomized control trial within male-dominated STEM departments showed that searches in the SDT search-intervention were significantly more likely to interview and hire a woman faculty member than those in the search-as-usual condition.
In short, SDT provides a rich empirical framework for understanding how a given context can foster positive outcomes.

**ADVANCE Project TRACS: Enhancing Research Capacity and Opportunity Initiative**

(Name) State University is a land-grant university serving a rural state that recently moved from Very High Research Carnegie classification to Higher Research Activity. (Name) State University houses 17 STEM departments nested within three STEM colleges: Agriculture, Letters & Science, and Engineering, and employs over 500 tenure-track faculty (27.9% are women in STEM, fall 2015). In 2012, the university received $3.5 million in NSF funding to support “ADVANCE Project TRACS” Empirically Investigating Transformation through Relatedness, Autonomy, and Competence Support. Project TRACS has focused on transforming the academic culture to cultivate the recruitment, retention, and advancement of STEM women faculty, and in the end, foster excellence in all faculty, through three initiatives. The Enhancing Work-Life initiative generates new programs, such as a family advocate and dual career assistance program, and builds on existing programs such as providing more flexible solutions for work-life integration through modified duties and stop the promotion and tenure clock policies. The Enhancing Cultural Attunement initiative promotes respectful communication, sensitivity to the dynamics of relationships within a particular culture, and respect for the values and beliefs of cultures through a “Broadening the Faculty Search” toolkit, an equity advocate program, and by engaging the university community in implicit bias education. Finally, the Enhancing Research Capacity and Opportunity initiative institutionalizes systematic research support for women faculty in STEM fields through hiring a Grant Submission
Training Coordinator who leads grant proposal writing workshops, provides individual proposal assistance, and connects new grant seekers to a mentoring network of successful grantees. It is through this last initiative that the Grant Writing Bootcamp was created.

**Grant Writing Bootcamp**

An early version of Grant Writing Bootcamp was developed by State University’s College of Education, Health, and Human Development, which set the foundation to build the theoretically informed ADVANCE Project TRACS Grant Writing Bootcamp. The goal of the six-week Bootcamp was to educate underrepresented faculty about the grant seeking process from the design phase to the culmination of a full grant submission. A dedicated staff member served as the facilitator, in this case the Grant Submission Training Coordinator, and was equipped with a modest budget (for refreshments, equipment, and supplies). Two different facilitators with diverse professional backgrounds, but both trained in cultural attunement and the objectives of broadening the participation of women in STEM, led the Bootcamps discussed in this study. One facilitator hosted one, and the other hosted two Bootcamps, for a total of three Bootcamps included in this study. Details on the qualifications, duties, and role of the facilitator are available in the Bootcamp “facilitator guide”, which is freely available on State University website.

Specific to SDT (Levy and Cardinal 2004, Smith et al. 2015), Bootcamp was designed to enhance **autonomy** of faculty by encouraging them to take creative approaches with topics, methods, and funding sources, enhance **competence** of the faculty by offering tools and templates for writing grant narratives so that they may skillfully navigate the grant paperwork and submission process, and enhance **relatedness**
by creating small groups of similarly situated faculty who could identify with one another and work toward a common grant-proposal goal as well as make connections to established, grant-successful mentors. In the weekly two-hour sessions, the first hour of the session was devoted to lecture or discussion, and the remaining hour consisted of hands-on writing and workshop activities. The general syllabus of Grant Writing Bootcamp is included in the Supplemental Materials, and a complete facilitator guide is freely available on State University website.

In alignment with the objectives of the larger NSF ADVANCE Project TRACS, Bootcamp was intended to engage women researchers in STEM disciplines. To ensure such women were prioritized as attendees, the facilitator identified women faculty in advance of the event using a list of new and currently employed faculty generated by the University’s Office of Planning and Analysis. The facilitator sent a descriptive invitation detailing the event to women in STEM so that they could register early. Following the advice of Melissa Latimer (Latimer et al. 2014), we took care to not draw attention to the gender-diversity goals of the program in the invitation in order to avoid backlash or stigma. The facilitator then circulated a public announcement to the broader faculty body, including male faculty and faculty in other disciplines, to fill any remaining seats in the Bootcamp. Facilitators fostered communication between each of the participants within and outside of the Bootcamp to provide feedback on documents and to provide assistance or one-on-one training as needed.

Study Overview

Grant activity data was assessed from women STEM faculty during one year pre- and one year post-Bootcamp. This pre/post-test design allowed us to examine grant
activity of the participants who engaged in one of three Bootcamps, offered six months apart, over an 18-month period, and compare it with those who did not participate in Bootcamp. The comparison sample was matched to Bootcamp participants on gender, rank, and STEM field category, as defined by the National Science Foundation ADVANCE indicators toolkit published by Virginia Tech University. Self-report evaluation data were collected after each six-week session to provide triangulation of impacts.

**Methods**

**Participants**

**Bootcamp sample.** Twenty women faculty in STEM fields participated (three were non-tenure track researchers and 17 were tenure track, 66.7% self-identified as White, 25% as Asian/Asian American, and 8% as Latin American). Of the tenure track faculty, 16 were at the rank of Assistant Professor with one at the rank of Associate Professor. Participants in STEM were distributed as follows among the broad categories of STEM: Biological/Agricultural Sciences (58.3%), Engineering (16.7%), Earth, Atmospheric and Ocean Science (16.7%), and Physical Sciences (8.3%). Participants were at State University an average of 3.7 years (range 1 to 10 years) before taking part in Bootcamp with an average of 8.3 years since receiving their Ph.D.

**Comparison sample.** Data were collected from a comparison sample (matched on rank and STEM field category as defined by NSF) of 12 women faculty members (three non-tenure track researchers and nine tenure track, 100% were identified as White) who did not complete Bootcamp during the same one year pre- and one year post-
Bootcamp. One year prior to Bootcamp, the comparison sample women had an average of 7.9 years since receiving their Ph.D.

**Procedure**

Grant activity data for one year prior to and one year following the Bootcamp were collected from the Office of Sponsored Programs with approval from the University Institutional Review Board. An evaluator external to Project TRACS collected self-report data from the Bootcamp participants by passing out a survey on the last day of the six-week session to assess how well Bootcamp supported their feelings of autonomy, competence, and relatedness, and a general evaluation of the Bootcamp. The self-report data could not be connected with outcome data due to anonymity procedures of the survey collection, thus the self-report data are included only as a descriptive index.

**Measures**

**General evaluation of Bootcamp.** Participants rated two general evaluation items: (1) “I think Bootcamp will have a positive impact on my career advancement” and (2) “I would recommend Bootcamp to my colleagues” using a 1 (*not at all true*) to 7 (*very true*) Likert scale. These two items were combined into an overall index of evaluation, with higher scores indicating more positive evaluations.

**Psychological need satisfaction in Bootcamp.** Faculty rated “how true” each of three items adopted from the Basic Need Satisfaction measure (validated by Deci et al., 2001) were by using a 1 (*not at all true*) to 7 (*very true*) Likert scale. One item for each psychological need was assessed: “I feel free to express my ideas and opinions in Bootcamp” (autonomy), “The Bootcamp increased my confidence in my ability to do
well at grant writing” (competence), and “I really like the people I worked with in Bootcamp” (relatedness).

**Grant activity.** Participant names were used to identify institutional data on project variables 12 months pre/post Bootcamp and, once collected, names were removed and participants were assigned a numerical code. Data were collected on the number of external grant proposals submitted, the number of proposals led as primary investigator (PI), the number of external grants awarded, and the amount of external funding dollars awarded. We took care to only count external application activity (e.g., NIH, NSF, USDA), and internal funding (e.g., from the university provost, university vice president for research, college level grants) was not counted. If an external grant was submitted but still pending (under review at the sponsoring agency or outcome not yet reported to the institution), it was conservatively coded as “not awarded.”

**Results**

**Analyses Overview**

To examine the impact of Grant Writing Bootcamp, we first present results of the self-report surveys to describe participants’ experience. Next, we conducted primary analyses of grant activity data for Bootcamp participants one year prior to and one year following Bootcamp. We then present our secondary analyses that examined grant activity for our comparison sample, who did not go through Bootcamp, to rule out the possibility that all grant activity improves over a given period of time. Finally, we simultaneously examined the comparison sample participants with the Bootcamp participants to test for possible differences in grant activity prior to self-selecting into
Bootcamp, and whether and how any of those differences in grant activity between these two samples changed one-year post Bootcamp.

**Results for Bootcamp Participants**

**General evaluation of Bootcamp.** A one-sample t-test analyzing differences from the neutral point (4 on a 7 point scale) showed participants reported agreeing that Bootcamp was a significantly positive experience ($M=6.18$, $SD = 1.04$, $t(19)=9.33$, $p<.000$).

**Psychological need satisfaction in Bootcamp.** Bootcamp also appeared to foster high levels of psychological need support. By design, grant writing Bootcamp aimed to support feelings of autonomy, competence, and relatedness. Survey data from Bootcamp participants suggest that the Bootcamp accomplished this goal. One-sample t-tests analyzing differences from the neutral point (4 on a 7 point scale) showed participants reported significantly high levels of autonomy ($M =6.40$, $SD=.82$, $t(19)=13.07$, $p=.000$), competence ($M=6.00$, $SD = 1.12$, $t(19)=7.96$, $p=.000$), and relatedness ($M=6.10$, $SD=1.12$, $t(19)=8.39$, $p=.000$).

**Grant activity.** Mean changes over time are illustrated in Figure 1. Paired sample t-test analyses found that compared to one year prior to Bootcamp, women researchers in STEM who participated in Bootcamp showed a significant increase in the overall number of external grants submitted, from $M=1.5$ ($SD = 1.67$) grants submitted per person to $M=3.7$ ($SD = 3.01$) $t(19)=3.69$, $p=.002$, Figure 1A). Analyses also showed a significant increase in number of proposals led as PI, from $M=1.1(SD = 1.34)$ proposal led as PI to $M=3.3$ ($SD = 2.65$) $t(19)=5.14$, $p=.000$, Figure 1B). Not only did the number of grant submissions increase from one year pre Bootcamp to one-year post Bootcamp, but
participation in Bootcamp was also associated with a positive increase in the number of grants funded one year later. Analyses showed a significant increase in the number of external grants awarded, from $M=0.25$ ($SD = 0.55$) awarded to $M=.95$ ($SD = 1.09$) $t(19)=2.66$, $p=.015$, Figure 1C). Finally, results also showed that Bootcamp participants experienced a significant increase in the amount of funding dollars awarded, from $M=$12,000 ($SD=$3,2198) to $M=$119,144 ($SD=$20,5987), $t(19)=2.27$, $p=.03$, Figure 1D), and this result likely underestimated the impact given that any pending applications were scored as “not awarded.”

**Results for Comparison Sample**

**Grant activity.** A paired sample t-test found that during the same time period, among women faculty who did not go through Bootcamp, there were no significant improvements or declines in the number of external grants submitted overall, in the number of proposals led as PI, in the number of external grants awarded, or in the amount of external funding dollars awarded (all $p$’s > .10). These findings are at least suggestive that improvements in grant activity associated with Bootcamp were not simply the result of the passage of time.

**Differences between Bootcamp participants and the comparison sample.** As shown in Figure 1C, Bootcamp participants were most often those who had not yet been externally funded. Women faculty in STEM who participated in Bootcamp, compared to the comparison sample had: a similar past number of external submissions one year prior to Bootcamp, a similar past number of amount requested in those external submissions one year prior to Bootcamp, and a similar past number of submissions as PI one year prior to Bootcamp. However, the Bootcamp sample had significantly fewer past external
grants awarded one year prior to Bootcamp ($M_{\text{Bootcamp}}=0.25$, $SD=.55$ versus $M_{\text{comparison}}=1.4$, $SD=1.5$ awarded to the comparison sample, $F(1,30)=9.38$, $p<.01$, $\eta^2_p=.24$), shown in Figure 1C. Given that the number of awards differed pre-Bootcamp, it is no surprise that Bootcamp participants also had significantly fewer past external grant dollars awarded one year prior to Bootcamp ($M_{\text{Bootcamp}}=$12,000, $SD=$3,219$8$) compared to the comparison group ($M_{\text{comparison}}=$187,415.92 $SD=$213,181 for those in the comparison sample, $F(1,30)=13.32$, $p<.001$, $\eta^2_p=.31$). As illustrated in Figure 1C and D, the significant difference between Bootcamp participants and non-participants prior to Bootcamp in the number of external awards received (and the dollar amount of those awards) was closed one year following Bootcamp, with participants in Bootcamp rising to the level of those who did not participate ($p$’s $>.45$).

**General Discussion**

This intervention demonstrated the positive impact of involving women faculty in a grant-writing educational intervention designed using self-determination theory. There is much more to securing grants than having a great idea. Bootcamp provided an enriched atmosphere that supported participants’ feelings of relatedness, autonomy, and competence, but most importantly Bootcamp was associated with significant increase in women’s number of external grants submitted, number of proposals led as PI, number of external grants awarded, and amount of external funding dollars awarded one year after participating in Bootcamp. The pattern of results show that Bootcamp is a low-cost educational intervention that enhanced women’s research capacity and opportunity over a one-year time frame. Results of a comparison sample of women in STEM (matched as much as possible on a number of variables) who did not attend Bootcamp, offer
suggestive evidence that it is not just simply the passage of time or other institutional policies or practices that were associated with women’s increased grant activity, but rather a positive impact of participating in Bootcamp. Results point to Bootcamp as one way to broaden participation in the national research agenda with the ideas and advances proposed by academic women scholars in STEM fields.

**Limitations**

There are several limitations to this study, including that this study took place at just one mid-sized research university serving a rural state. Generalizations to other university settings and types remains to be tested with future adoptions of grant-writing interventions. Also, we were unable to fully match all 20 women who participated in Bootcamp because of the very nature of the problem; there were too few women faculty in STEM. As such, data comparisons should be interpreted with caution and serve only as a second lens by which to examine the impact of the Bootcamp.

Ideally, future research testing the impact of the Bootcamp intervention will include random assignment to the intervention as well as a larger sample size. A larger sample size, for example, would allow tests of intersectionality to unpack the possible impacts on women in general, and possibly women of color in particular. Although our sample was majority White, the participants showed greater variation in race and ethnicity compared to the university at large. Moreover, the average participant in this study was a beginning level professor nearing retention review, which suggests Bootcamp might be best suited for new women professors; however, this is an empirical question. A larger sample would thus allow for a closer examination of who benefits most from Bootcamp.
It is unclear which aspect of Bootcamp was responsible for the positive outcomes. As with many field intervention studies, we examined the impact of the whole intervention versus its various pieces. What is more, it is not possible to say how feelings of autonomy, competence, and relatedness directly predicted grant activity outcomes. Although we included a self-report survey which did confirm that the design of the Bootcamp met the SDT criteria, because the survey was completely anonymous, it was not possible to link the relationships among SDT constructs and grant activity.

**Implications**

Limitations notwithstanding, the finding that participation in a six-session grant-writing intervention designed to support autonomy, competence, and relatedness needs is positively associated with grant success is especially meaningful considering the national agenda to broaden the participation of women in STEM (Mitchneck et al. 2016, Valantine and Collins 2015). Many universities are becoming more progressive in the arena of work-life policies and practices (Tower and Dilks 2015), which are vital to retaining women faculty members. Here, we shine a light on another worthy area of intervention: the grant getting process, which is a vastly understudied topic (Frantz 2013). What we do know, is that dissatisfaction with research support is strongly associated with women faculty’s intentions to leave their university (Xu 2008). One could speculate then, that Bootcamp might have downstream implications on the retention of academic women in STEM.

To be sure, expanding external funding within academia is a complicated goal in light of the unpredictability of the national funding climate. This Grant Writing Bootcamp is just one way that university administrators might improve the research
capacity for an often-underutilized group – women in STEM. Our results point to the value in committing resources to hire a dedicated person to serve as a facilitator for Bootcamp. At our own university, this position, combined with other duties, is now sustained within the Center for Faculty Excellence in the Provost’s Office as part of a larger coordinated effort to provide professional development opportunities to faculty.

Bootcamp falls under the recommendations by Porter (2011) who suggests that “home-grown” grant writing workshops provided by research office staff and successful faculty members is an inexpensive strategy that may yield positive returns. As Universities work to adopt or implement their own Bootcamp, it is important to heed the advice of Easterly and Pemberton (2008) who detailed barriers and supports for writing proposals for external grant funding as experienced by women associate professors at three state universities in Idaho. Their recommendations for decreasing barriers and increasing supports include many aspects of our Bootcamp including a proposal writing mentorship program and internal networking (which would likely improve feelings of relatedness), providing an awareness of services at the university for grant writing assistance (which could increase competence) and avoiding “cookie-cutter” support that likely does not honor the autonomy needs of individual faculty.

Research administration should be aware of and attend to implicit biases that impact women faculty members in the area of research, including receipt of internal and external research funding (Easterly and Pemberton 2008). University leaders interested in advancing women’s research agenda should consider adopting bias inoculation training for research administration staff and other key personnel. Indeed, our Bootcamp facilitators were hired, in part, for their attunement to gender and diversity issues,
participated in ongoing educational trainings around implicit biases aimed at women in STEM, and were required to report their efforts in serving and supporting this underrepresented group of faculty. Indeed, accountability is a key component of a successful sustained effort at broadening the participation of women faculty in higher education (Mitchneck et al. 2016).

**Future Directions**

Grant Writing Bootcamp focused on developing an original research proposal. Once the proposal is submitted, women might also have concerns that their proposal could be met with possible gender discrimination during grant reviews (Boyle et al. 2015, Ley and Hamilton 2008, Marsh et al. 2009, Mutz, Bornmann, and Daniel 2012). For example, Kaatz et al 2016 showed that despite favorable written summaries of NIH proposals, funding rates were lower for women than men suggesting a shifting standard depending on the gender of the investigator. This possible source of bias, coupled with the relatively low rates of funding from national agencies, suggest that most proposals will be rejected. At NSF in fiscal year 2014, for example, the success rate of competitively reviewed proposals ranged from 17% to 27%, with an average of a 23% (NSF 2015). Therefore, the next step of Grant Writing Bootcamp is the creation of a new Bootcamp that extends to revising and resubmitting proposals. The impact of this next level of Bootcamp remains to be tested.

**Conclusion**

Universities should consider ways of broadening participation efforts that extend to research infrastructure and support for women who are already part of the university community. The Self-Determination Theory (Deci and Ryan 2000, 2012) informed
design of a Grant Writing Bootcamp resulted in greater research capacity and opportunity for those women in STEM who participated. With a modest but sustained investment, a strategic and carefully designed intervention like this Grant Writing Bootcamp can add vital diversity and impact to scientific discovery, while also adding to the enterprise of a university.
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Figure 1

A. Number of grant submissions

B. Number of PI grant submissions

C. Number of Grants Awarded

D. Amount Awarded

- **Bootcamp**  
- **Comparison**
Figure Legend

*Figure 1.* Results from analysis of the Bootcamp participants one year pre- and one-year post- Bootcamp as contrasted to a comparison sample of similar faculty during the same time period. Panel **A**: Number of grants submitted. Panel **B**: Number of grants submitted where the faculty member was the PI. Panel **C**: Number of grants awarded. Panel **D**: Amount of money funded in the awarded grants in US dollars.