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DOCTORAL TRAINEE PREFERENCES FOR CAREER DEVELOPMENT RESOURCES: THE INFLUENCE OF PEER AND OTHER SUPPORTIVE SOCIAL CAPITAL

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ABSTRACT

Aim/Purpose: The purpose of this paper is to understand doctoral and postdoctoral trainee preferences for different models of career development resources and how career-relevant social capital affects these preferences.

Background: The supply and demand mismatch within the academic job market is augmented by a growing complaint that trainees are not prepared for a range of careers beyond the academic. So, trainees are often put in a position to seek out resources to navigate their career search processes, yet, the career development strategies that they pursue and the preferences that they have for different types of career development resources is not well understood. Drawing from existing higher education and social capital theory literatures, we examine how trainee preferences for career development resources are shaped by the career support

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received from their Principal Investigator (PI) and peers, as well as their own self-efficacy.

Methodology We focus on doctoral and postdoctoral trainees in the biomedical science and engineering disciplines at two sites (but involving three institutions) funded by the National Institutes of Health (NIH) Broadening Experiences in Scientific Training (BEST) Program, a program designed to help prepare trainees for a broad variety of bio-medically related careers within and outside of academic research. Using a survey of both BEST and non-BEST trainees (those not formally in a BEST program), we conducted descriptive and logistic regression analyses of survey data to assess the factors affecting trainee preferences for three different types of career development models: (1) an intensive cohort career development experience (BEST "cohort"), (2) ad-hoc resources ("cafeteria"), or (3) choosing not to seek any career development resources at all.

Contribution This study contributes to the doctoral trainee research base by (1) taking a quantitative approach to cohort based interventions for career development, concepts historically largely examined by qualitative methods, (2) distinguishing among the types and sources of support to better tease out the different types of relationships trainees may have, (3) identifying these issues for both the experiences of the doctoral student and the lesser-studied postdoctoral fellow, and (4) moving beyond a single institution study context by examining data from three different university programs, which allows us to control for institutional and demographic characteristics which importantly is recognized as a significant need in cohort model research.

Findings We find that social capital in the form of a supportive environment and peer support was critical for shaping career development preferences. Cohort programs were particularly attractive to trainees interested in careers outside of academic science and who had low career self-efficacy. Trainees who reported high levels of PI support were less likely to pursue other career development resources, while students reporting low levels of PI support were more likely to choose to participate in a career development focused BEST cohort community. Trainees who reported low levels of PI, department, and peer support were less likely to participate in formal career development events or resources offered by academic institutions.

Recommendations for Practitioners These findings can inform university and career development administrators about the social context in which trainees develop and how that matters for how they prefer and value different formats and intensities of career support. Our recommendations point to the importance of developing (if possible) different models for providing career development resources, so trainees can take advantage of the ones most suitable for them. We further recommend programs consider different marketing strategies for the types of career development programs they offer in order for trainees to understand their options and engage in the resources that make the most sense for them. Highlighting the benefits of cohort based programs will help attract those trainees who desire and need that type of support. This clarity in program goals not only helps to set and manage expectations for trainees to know what the outcomes can be, it also helps to inform programs in terms of what resources to use and measure in helping move trainees along in their own career progression.

Recommendations for Researchers We recommend empirically differentiating the different types of support trainees may receive, as our results emphasized that the source of support matters.

We also recommend that this study be replicated across different disciplines to assess the extent to which these findings apply universally.

Impact on Society: This research is especially important for its impact for the job market and graduate higher education. With the growth in graduate career development training available across U.S. campuses, by designing and targeting the appropriate interventions for career development in academic institutions we can better prepare trainees for their next steps after training as they enter into the job market.

Future Research: Future research needs to further examine the black-boxes that are the doctoral student and postdoctoral experiences. This literature is growing, but we need a more concerted effort to understand how factors like support (in its various forms) work with other factors, like career development efficacy. Within this context, future research should look at first generation trainees, as well.

Keywords: social capital, biomedical, career development, doctoral students, postdoctoral fellows, cohorts

INTRODUCTION

Career opportunities and interests of doctoral trainees are broad (Sauermann & Roach, 2012), with growing interests in non-academic careers in industry and other sectors, including both research and non-research career pathways. This is evident in employment statistics, where 39 percent of PhD recipients in the biological and other life sciences are employed in four-year academic institutions, down from 42 percent in 2013 (National Science Board, 2016). Despite the rising interests in broad careers, doctoral students express concern that their training is designed for tenure track faculty careers, ignoring preparation for careers outside of the academic marketplace (Biomedical Research Workforce Working Group, 2012; Golde & Dore, 2001). This is also a global and cross-disciplinary issue: a 2015 *Nature* survey of STEM graduate students found that only one-third of respondents said that their supervisor "has useful advice for careers beyond academia" (Woolston, 2015). The reality is that university career development resources are typically geared to the undergraduate career placement needs, and doctoral training is mostly intended to prepare specifically for tenured academic careers (Campbell, Fuller, & Patrick, 2005; Juliano & Oxford, 2001; Mangematin, 2000). Further, an individual's doctoral advisor or postdoctoral supervisor may be the most direct support for trainees. Yet, faculty do not necessarily have the exposure, knowledge, or connections to facilitate the training of doctoral students for broader career pathways (nor should they be expected to) (Fuhrmann, Halme, O'Sullivan, & Lindstaedt, 2011; St Clair et al., 2017) and tend to gravitate toward advising and mentoring practices that narrowly lead to academic careers (Schillebeeckx, Maricque, & Lewis, 2013). This situation can ultimately leave trainees who have broader career interests on their own to locate the resources they need to identify the career that they want and also have the skills to pursue and succeed in that career.

Our particular interest is in how peer-related social capital (the support a trainee receives from another trainee) and individual career-related efficacy (how confident the trainee is in his/her career development) influence the types of career resources doctoral trainees in STEM (science, technology, engineering, and mathematics) disciplines pursue. Specifically, we ask: what factors drive PhD student and postdoctoral fellow preferences for different models of university or other career development resources as they are completing their programs, and what role does career-relevant social capital play? An improved understanding of the need and preference for different types of career development resources would help university efforts to effectively provide career development programming and also provide researchers and practitioners with a deeper insight into doctoral trainee experiences. Our research is based on data from three U.S. universities that have received Broadening Experiences in Scientific Training (BEST) grants from the National Institutes of Health (NIH). This research setting offers an opportunity to examine differences among trainees who opt for different programming

models developed at different institutions. Specifically, our interest is in how trainees select *ad hoc* "cafeteria" career development resources versus more intensive cohort programs that are designed to both tailor programmatic resources for a smaller and consistent group of trainees and at the same time foster peer-to-peer relationships as a mechanism of learning and development. Drawing from theoretical foundations of social capital and individual efficacy, we examine the individual and interpersonal factors that shape career resource preferences.

BACKGROUND: INSTITUTIONAL SOLUTIONS FOR DOCTORAL TRAINEES

Growing interest among PhD graduates for careers outside of academia (Alberts, Kirschner, Tilghman, & Varmus, 2014; Fox & Stephan, 2001; Sauermann & Roach, 2015; Thiry, Laursen, & Loshbaugh, 2015) has heightened the discourse and actions to develop appropriate training to support and prepare PhD students and postdoctoral fellows (referred to in this article as doctoral/postdoctoral trainees) for broad career opportunities (Chatterjee, Ford, Rojewski, & Watts, 2019; Leshner & Scherer, 2018). While faculty have traditionally served as mentors to support their trainees to succeed in the academic career market, they may not be the best resource for most trainees to prepare themselves for non-academic positions (Von Amim, Albrecht, & Missra, 2017; Woolston, 2015). Certainly, individual universities or programs may initiate local programming to support the advice and mentoring of doctoral and postdoctoral trainees for broader careers, but this type of support services is not common (nor has been catalogued) across institutions (Fuhrmann et al., 2011.) As the literature on doctoral career development continues to grow, a broader understanding of the diverse approaches that institutions may adopt and their outcomes may be better understood. For example, peer-led training programs have been developed at a number of institutions that have recognized the need for doctoral-trainee specific career development support. Building on theories and evidence of the importance of peer-related social capital (Gardner, 2007; Higgins & Kram, 2001), they utilize peer-initiated and -led activities tailored to specific trainee interests and needs (Ritchie, Perez Cardenas, & Ganapati, 2018).

These initiatives reflect dialogue on doctoral and postdoctoral preparation taking place at the national level. A recent U.S. National Academies study (Leshner & Scherer, 2018) has called for a number of reforms of graduate STEM education, including in regard to providing career development resources for those interested in non-academic careers. They note for example that:

> *"Students would be encouraged and given time, resources, and space to explore diverse career options.... Students with potential interests in nonacademic careers would be provided with opportunities to attend workshops and seminars about jobs in a wide range of industries, nonprofit organizations, and government, together with opportunities for placements in nonacademic job settings. Internships with corporations, government agencies, or nonprofit employers during summer months or the school year would become the norm rather than the exception for graduate students seeking careers outside of academia."* (p. 128-129)

Along similar lines, both of the two major U.S. federal research agencies (the National Science Foundation (NSF) and the National Institute of Health's (NIH)) have created funding initiatives that support programs aimed at doctoral and postdoctoral trainees that move beyond traditional training and career development models. NSF's Research Traineeship (NRT) program, for example, is designed to build graduate student capacity and experience in working with complex societal issues, so that by "providing students with opportunities to develop career-aligned skillsets, NRT projects are helping change the landscape of graduate education and better prepare future STEM scientists for diverse careers" (National Science Board, 2018). Our focus in this article is on program creation and investments made by the U.S. National Institute of Health's (NIH) in the Broadening Experiences in Scientific Training (BEST) program opportunities (National Institutes of Health, 2013; National Science Foundation, 2015).

NIH BEST is an innovator in this area through the creation of a consortium of institutions that align with their local interests, but also provide a community of institutions to share knowledge among them. As described by the NIH, BEST grants *"were designed to develop sustainable approaches to broaden graduate and postdoctoral training, aimed at creating training programs that reflect the range of career options that trainees may ultimately pursue"* (NIH, 2013). BEST specifically addressed an expansion of skills and competencies aimed at improving doctoral trainees' career perspectives and opportunities (National Institutes of Health, 2013; National Science Foundation, 2015). Specific to biomedical trainees, the BEST Program targets career development for doctoral students and postdoctoral fellows (collectively called trainees) with interests in broad careers, both research and non-research oriented. The BEST consortium currently includes 17 funded programs at 18 U.S. universities (one program is collaboration between two institutions). Enrollment in BEST provides trainees with access to tailored seminars and hands-on workshops, as well as providing opportunities for internships, all of which are designed to build exposure, experience, and understanding of careers outside of the academic sector. BEST awards provided five years of institutional support to develop innovative approaches to expand trainee career development training.

Yet, the question of who is attracted to a cohort-type of intensive program remains. What types of trainees are attracted to this model, over other types of career development resources? Of the 18 BEST institutions, most offer campus-wide resources (an *ad hoc,* or *cafeteria* model as we refer to it here), but three sites adopted a *cohort* model (trainees go through all programming together, over an extended period of time) [the Emory University/Georgia Institute of Technology partnership in Atlanta, Georgia; Michigan State University (MSU); and the University of California at San Francisco], two of which are the focus of this paper. Cohort models subscribe to the theory that learning occurs through sustained participation in activities and through personal interactions that occur within an identified and circumscribed community of practice, like their peers (Lave & Wenger, 1991). Overall, we understand little about why trainees pursue the career development resources available to them or the motivating factors that leads them to choosing one type of resource over another. We generally understand less about the needs and interests of trainees who might seek out more *intensive* resources, cohort programs, in particular.

LITERATURE REVIEW

COHORTS IN THE DOCTORAL TRAINING PROCESS

The BEST cohort model is similar to a community of practice, where a group of trainees learn from their own experiences and the experiences of other trainees in the group. In essence a community of practice is a learning partnership (Wegner, 2009). Communities of practice, like cohorts, are defined as a group of people who voluntarily engage in a regular process of collective learning in an area of shared interest (Wegner, McDermott, & Snyder, 2002). Here, group members share an identity and commitment to a particular domain, area of interest, or specialty, engage in joint activities and discussions around this shared commitment, and build relationships and networks with others who have similar interests, thus representing a community; together they develop a set of resources, stories of successes and failures, as well as tools to address issues relevant to the domain of interest (Wegner et al., 2002). In other words, the BEST cohorts and associated faculty and staff make up a community of practice, where members actively support and value career development activities and the acquisition of new career relevant social capital. Developing a BEST Program community of learners creates a support system with a third space—complementing lab spaces, classroom learning, and personal domains—where trainees can take ownership of their career development.

While cohort models may be appealing for the creation of a strong peer social support system, they do come at some costs. Cohort models are resource intensive and serve fewer trainees. Programming is tailored to participants who opt in to a more personalized experience allowing for deeper exploration of and reflection on topics. An alternative approach, that we refer to here as the *ad hoc* cafeteria

model, allows trainees to pick and choose specific resources or events where students may register for events as they occur, attending one or several, but do so independently and not as part of a group. The advantage of the cafeteria/*ad hoc* model is that it requires less time, but trainees may receive over-generalized programming that may not meet their needs and they do not tap into the in-depth peer learning that is common in cohort learning communities. An important advantage of the cohort model is that it is focused on the needs of participants in the cohort and creates a community of practice where resources may be shared among participants, yet with the disadvantage that it takes more time and program administration.

Degree programs also adopt cohort models, where students are admitted as a group, that are designed to increase retention, graduation rates, and overall academic success rates of students (Lei, Gorelick, Short, Smallwood, & Wright-Porter, 2011). Such "cohorts" build a peer learning framework for the first year or more of classroom study. In the BEST programs that have elected to use the cohort model, trainees come together from (often) different disciplines and stages of degree completion, but all with a shared interest in exploring, if not pursuing, broad careers outside of academe. They participate together in various seminars and events, but also develop relationships with one another where resources and advice may be shared. Many universities have existing career development resources targeted to students to access at will; most, however, are not built to intentionally create community around career development and exploration.

Interpersonal Career Supports for Doctoral Trainees

There is a fast-growing literature on doctoral and postdoctoral experiences deepening our understanding of these trainee career interests and development processes. Studies of such training point to a range of struggles faced as students and postdocs proceed through their programs, how these struggles may be mitigated, and their effect on attrition (Abedi & Benkin, 1987; Jazvac-Martek, Chen, & McAlpine, 2011; Lovitts, 2001). For example, intellectual stressors like writing blocks, lack of time, and difficult tasks, resource constraints such as financial barriers and lack of office space, and personal and motivational issues matter in program persistence and performance. While financial support is critical for most, many studies have pointed to interpersonal relationships and support mattering even more for trainees (Gardner, 2007; Jazvac-Martek et al., 2011; Lovitts, 2001).

Social capital and career development

Social capital theory (Bourdieu, 1986; Lin, 2001) provides a useful foundation for providing potential insight into what drives trainee needs and preferences for career-related support where various instrumental but also psychosocial resources are gained through interpersonal and group relationships. Psychosocial support refers to the encouragement and other types of emotional support by peers and others that help to build and maintain confidence in the ability to persist and succeed in degree-seeking activities (Blake-Beard, Bayne, Crosby, & Muller, 2011; Curtin, Malley, & Stewart, 2016). In the doctoral and postdoctoral setting, as trainees deepen relationships with their peers, they may be able to access resources such as knowledge and connections which support their career development.

Among the various social capital resources that trainees may acquire (leads, connections, etc.), access to psychosocial support for doctoral and postdoctoral trainees is important because the lack of this support (or perceived lack of support) can have a negative effect on trainee confidence or efficacy in their ability to perform and succeed, in turn leading to attrition or dropout (Abedi & Benkin, 1987; Littlefield, Taddei, & Radosh, 2015; Maher, Wofford, Roksa, & Feldon, 2018). Empirical evidence has shown that psychosocial support can come from a variety of sources including supervisors, non-supervisor faculty, and peers (Baker, Pifer, & Griffin, 2014; Flores-Scott &, Nerad, 2012; Gardner, 2007; Gotlieb et al., 2019; Grant-Vallone & Ensher, 2000; Jazvac-Martek et al., 2011; Lovitts, 2001; Meschitti, 2019), each of whom may provide different types of resources and advice. We also know that interpersonal relationships, both supervisory and peer, provide important social and psychological support for student success in many dimensions (Curtin et al., 2016; Weidman & Stein, 2003), and

we expect that cohort members provide this support for career development, as well. These resources can come in the form of support or advice and are critical to career development processes (De Graaf & Flap, 1988; Lin, 2003; Marsden & Hurlbert, 1988) as they facilitate the flow of relevant information and helpful connections (Lin, 2001) – similar to the BEST cohort models. Seibert, Kraimer, and Liden (2001) tested the tenets of social capital theory related to career progression and found empirical evidence that the extensiveness of one's social networks impacted access to information and to key resources that in turn impacted career success.

The role of faculty

The literature on the role of faculty in doctoral development often focuses on mentoring and socialization for faculty careers. In the doctoral and postdoctoral training process, faculty should be key members of trainee professional social networks. Faculty are expected to support, advise, and mentor trainees throughout training completion and toward readiness for their preferred career (Golde & Dore, 2001; Van Emmerik & Hetty, 2004). These relationships that are formed among students and faculty make up a unique component to doctoral student and postdoc experiences (Baker et al., 2014). In an academic setting, the training that an individual receives is typically structured around an apprenticeship model. The relationship between a faculty member and a trainee is the key form of learning and "knowledge transmission" (Baker et al., 2014; Barnes & Austin, 2009), affecting the work they produce (Brownell & Tanner, 2012, their attrition in the program (Bair & Haworth, 2004; McAlpine & Norton, 2006), and even the kinds of jobs and career development resources they pursue (Chatterjee et al., 2019; Saks & Ashforth, 1999; St Clair et al., 2017). Baker et al. (2014) identified three different roles that are key to the trainee experience: supervisory, advisory, and mentorship roles, all of which provide varying levels of support in teaching skills and developing knowledge in trainees, guiding the trainee through the program, and committing to the trainee's psychosocial development. These enable the trainee to both learn from experts and role models in the field, but also get professional development support and socialization (Holley & Caldwell, 2012). However, as Lam and de Campos (2015) noted, these levels of support are not always at a sufficient level for the trainee, leaving the trainee wanting. Specifically, regarding career development, a lack of support from advisors or supervisors can be particularly detrimental as these individuals are the traditional and central figures in such preparation (Golde & Dore, 2001; Van Emmerik & Hetty, 2004).

While the majority of faculty may not have the resources or experience to support their trainee's career interests, they may impact psychosocial support that is important for trainee confidence in pursuing broad careers. Faculty perspectives on this, for example Watts et al. (2019), vary and there are faculty who overtly are not supportive of their trainees pursuing broad career outcomes due to a lack of knowledge about non-academic career options (Dowd & Kaplan, 2005) or are pressured to develop protégés that are well placed in academia (Blackburn, Chapman, & Cameron, 1981; Fogarty & Saftner, 1993; Watts et al., 2019). From a trainee perspective, this lack of support can pose challenges to development for broader career outcomes (Chatterjee et al., 2019). The trainee experience is often one of isolation, which may lead to poorer performance, slowed degree completion or attrition, and diminished confidence (Ali & Kohun, 2007; Blanchard, 2018; Jairam & Kahl, 2012). As St. Clair et al. (2017) found, a lack of traditional support can affect what strategies trainees take to improve their career development. Importantly, as found in a study of STEM postdocs, interventions have proven to be very effective in helping to guide these decisions for trainees by meeting their career development needs that are otherwise unmet (Hudson et al., 2018).

Peers and career development

A trainee's peer-community plays a role in the trainee's development by mitigating a sense of isolation through providing instrumental and psychosocial support (Pilbeam, Lloyd-Jones, & Denyer, 2013; Weidman & Stein, 2003; West et al., 2011). For example, studies have pointed to psychosocial benefits stemming from greater communication and trust among students (Maher, 2005; Swayze & Jakeman, 2014). Trust and support in particular have been shown to make participants feel less iso-

lated and a part of a community (Ali & Kohun, 2007; Barnett, Yerkes, Basom, & Norris, 2000; Potthoff, Dinsmore, & Moore, 2001), have deeper discussions regarding academic and personal issues (Teitel, 1997), and even compensate for a lack of traditional mentoring support mechanisms (Mullen & Tuten, 2013). This has allowed for better student-faculty relationships (Maher, 2005) and even navigation through program or department administrative policies and procedures (Lei et al., 2011). For trainees with broad career interests, this type of support may not only provide encouragement to pursue broad career directions and mitigate any lack of support from advisors, but also provide navigation through campus resources.

In their qualitative assessment of the graduate student day-to-day experience, Jazvac-Martek et al., (2011) found that peers offered motivating and often emotional support and stress relief, whereas non-advisor faculty offered belonging and collaboration opportunities, often establishing a network for the trainees, and advisors offered more direct support for activities and affirmation of achievements. For postdocs, where fellowships are often a "prerequisite" for scientific academic careers, the support received from supervisors is critical for the postdoc to develop their identity as a scientist (Hudson et al., 2018).

Through the BEST cohorts, individuals may gain social capital through their social relations and formal and informal hierarchical structures in their organization, among other factors (Bourdieu, 1986; Lin, 2001). According to Lin (2001), among other things, social capital enhances the outcome of actions because it facilitates the flow of information and provides social connections. From the above, we expect that having lower social capital, results in fewer resources and support for career goals. Therefore, we expect to find those with lower social capital to pursue a cohort model. We hypothesize the following:

> *Trainees with lower levels of support for their career interests are more likely to pursue career development resources that provide a support structure (cohort), while those with higher levels of support will be more likely to select discrete ad hoc resources.*

The adoption of the BEST cohort model on multiple campuses allows us to examine trainee preferences for different types of career development resources, shedding light on the needs and interests of doctoral/postdoctoral trainees. We analyze differences across trainees at different career stages (doctoral students and postdoctoral fellows). We differentiate between pursuit of a learning community via the cohort model (BEST program affiliation) and less intensive *ad hoc*/cafeteria programming (career development workshops, seminars, and other non-credit courses), and trainees who opt for neither the BEST nor *ad-hoc* resources, in order to capture the varying interests and activities of trainees in their career development.

MATERIALS AND METHODS

DATA

Our study is based on data collected as part of the assessment of two NIH BEST programs, implemented at three U.S. academic institutions: Michigan State University and two universities in Atlanta (GA) that comprise Atlanta BEST – Emory University and Georgia Institute of Technology. We limited our data collection to these institutions because they are among the few BEST programs who maintained a cohort model of career development. The Atlanta and the MSU BEST programs uniquely sought to enable a community of trainees, mentors, resources, and career development resources to improve career self-efficacy and attainment of new career social capital. This study involved an initial survey as the BEST program was being launched ("entry survey") and was designed to examine trainee career interests and access to career development resources at the beginning of the BEST program on their campus. The survey included questions on specific career interests, use of various career development resources, engagement with trainee's PI and other faculty, and trainee confidence in achieving their career goals. In all instances, we captured survey data about trainees

who participate (or do not participate) in BEST-related career development programming, and use these data to inform what we can learn from trainees who opt into an intensive cohort model and how their needs, aims, and goals may differ from trainees attracted to the *cafeteria* model of career development programming. The survey was primarily designed by the NIH contract research organization, Windrose Vision, LLC, with some opportunity for input from the individual BEST sites.

The survey was implemented in fall 2015. At each site, selected enrolled/affiliated PhD students and postdoctoral fellows (all BEST trainees as well as trainees not affiliated with the program) in biomedical related disciplines at each university were asked to participate in the survey. All trainees in these lists received an electronic survey online. For Atlanta BEST, lists of trainees were obtained from the graduate school on each campus and provided directly to Windrose for survey implementation. Lists were checked to ensure that all BEST trainees were included, while the selection of non-BEST trainees for inclusion in the mailing list was based on home department or program (biomedical discipline) as well as student status (having completed at least two years of their doctoral program) in order to select trainees most comparable to Atlanta BEST trainees. All postdoctoral fellows affiliated with labs or departments in these same disciplines were included.

Michigan State, in contrast, managed the survey implementation in-house. Graduate students and post-doctoral scholars were identified by the registrar's office and the Office of Human Resources, respectively, and MSU BEST program staff identified the students and post-doctoral scholars who were in graduate programs or departments that were relevant to the BEST experiment. While the Atlanta BEST survey administration was managed by the external research organization, MSU BEST program staff managed the execution of their survey. Of note: both surveys were the same instrument designed by NIH in collaboration with the BEST consortium; only the administration differed.

The response rates for the Atlanta and Michigan State surveys can be found in Table 1.

Table 1: 2015/2016 Grad Students and Postdocs in Atlanta and Michigan State BEST

	PhD Students	Postdocs	Total	Response Rate
Atlanta	559	333	892	38%
MSU	284	39	323	46%
Total	843	353	1,215	

Analysis

We first conducted a descriptive analysis that provided an overview of the characteristics of the trainees in the two NIH Best programs, as well as a series of stepped logistic regression models to examine the characteristics of trainees who engage in the cohort model as compared to those who elect into activities on an *ad hoc* basis, selecting a cafeteria model. Finally, we also examined the characteristics of independent trainees, or those who opt not to pursue either of these sets of resources. This may help to better understand trainees who show less need for career development programming, or, alternatively, those harder-to-reach subsets of trainees who may be left out of current career development training opportunities. Models were tested for goodness of fit (Hosmer – Lemeshow goodness-of-fit tests). All analysis was conducted using STATA software.

Variables

The variables included in our analysis are briefly described below and summarized in Table 2.

Table 2: Survey Questions and Variable Coding Descriptions

Construct	Dependent Variables
Cohort Trainee	Trainee admitted to Atlanta or Michigan State BEST. (Coded: 1= "yes" 0 = "no")
Cafeteria Trainee	In the last twelve months have you… "Attended: a course about career planning not for credit", "a career-related event at your institution (e.g., workshop, panel, career fair, seminar, etc.)", or "a career related event NOT at your institution (e.g., workshop, panel, career fair, seminar, etc.)"? (Coded: 1= "yes" 0 = "no")
Independent Trainee	Trainee who does not participate in cohort or cafeteria resources above.
	Independent Variables
Efficacy and Career Interests	
Career Search Efficacy	Summative variable created from four different career development confidence variables (alpha. 0.85): How confident is the individual to: assess his/her abilities to pursue his/her desired career path(s), determine the steps to pursue his/her desired career path(s), seek advice from professionals in his/her desired career path(s), and identify potential employers, firms, and institutions relevant to his/her desired career path(s). Each component coded as: 5 for "completely confident", 4 for "highly confident", 3 for "moderately confident", 2 for "minimally confident", and 1 for "not at all confident".
Broad Career Interest	Is the individual "not pursuing" or "definitely not pursuing" a principal investigator position in a research-intensive institution and a research and teaching faculty position? (Coded: 1= "yes" 0 = "no")
Social Capital	
Advisor Support	"I am encouraged by my PI/thesis advisor to pursue my career goals" Coded 5 for "strongly agree", 4 for "agree", 3 for "neutral", 2 for "disagree", and 1 for "strongly disagree".
Department Support	"I am encouraged by my graduate program/department to pursue my career goals." Coded 5 for "strongly agree", 4 for "agree", 3 for "neutral", 2 for "disagree", and 1 for "strongly disagree".
Peer Support	"In the past 12 months, how often have you discussed your career goals with your peers?" Coded 6 for "weekly", 5 for "monthly", 4 for "quarterly", 3 for "semiannually", 2 for "annually", 1 for "never".
Demographics	
Gender	Respondent is female (male=0)
Citizen	Respondent is U.S. citizen (by birth or naturalization)
Underrepresented minority (URM)	Respondent self-identifies as either Black/African Amer./Hispanic/Native Amer.
Asian	Respondent self-identifies as Asian
PhD Student	Respondent is a PhD student (Postdoc=0)
Institution	Coded 1 for Atlanta BEST and 0 for Michigan State BEST

Dependent variables. Preference for career development resources is measured by two binary variables. Trainees who opt for a cohort model were identified by whether they had been admitted to either the Michigan State or Atlanta BEST programs. Thus, trainees had to apply to be a BEST cohort member. Trainees were admitted on a few different criteria, including how far along they were in

the program, their academic performance, and letters of recommendation. Because both programs required an application to be a BEST cohort member, there was a straightforward way to measure this affiliation. "Cafeteria" trainees were identified by whether they had elected to participate in certain stand-alone career development courses or events. While trainees were asked about a number of career development resources that they had used/participated in during the last year (including talking with advisors and engaging in networks), we limited this variable to non-BEST trainee participation in actual courses (not for credit), workshops or events in order to isolate career resources that involve some aspects of seminars and training, similar to BEST resources.

Some of the career development resources were open only to BEST trainees (cohort members), whereas other were options for both BEST and non-BEST trainees (some activities were open to anyone interested). Across all three schools, these types of activities fell into a few types of buckets: 1) skill development, where trainees could learn how to build a résumé or CV or take courses in leadership or communication, for example; 2) networking and mentoring sessions, where professionals would come in and talk details about their jobs to give trainees realistic pictures of what the jobs entail, the requirements to get those jobs, and how to best market themselves for those jobs; 3) awareness sessions, where trainees took personality assessments so as to help them better understand their natural strengths and weaknesses that may help them narrow their career interests; and 4) internships and externships, where trainees received support in locating appropriate opportunities for their interests. As seen in Table 2, cafeteria trainees were those who were not a member of the BEST cohort, but had participated in university events like career planning courses; career-related workshops, career fairs, or seminars; or other career-related events not at their university.

Independent variables. There are a variety of factors that can explain the path that individuals take to further their career development. We sought to disentangle whether trainees seek a cohort program or cafeteria model from the existing interpersonal sources that provide social capital relevant to career development, from how confident they are in the career search process, and from other demographic characteristics that might explain preferences or tendency to pursue these different career resources. The independent variables described below include the demographic control variables, as well as factors that prior studies suggest influence career development needs of individuals (Ali & Kohun, 2007; Lent & Brown., 2013).

The first independent variable of interest is career search efficacy. We expect that trainee confidence in their own ability to take the steps to obtain their preferred career may play a role in their decision to seek out different career resources. Informed by the adapted Social Cognitive Career Theory (SCCT) model (e.g. Lent & Brown, 2013), we created a summative variable from four different survey questions that assessed confidence in different career development components (alpha: 0.85). This summative variable captured how confident each individual was in assessing their abilities to pursue their desired career path(s), determining the steps to pursue their desired career path(s), identifying potential employers, firms, and institutions relevant to their desired career path(s), and achieving their career goals.

The second independent variable we are interested in is the career social capital that trainees have. Interpersonal support resources can be critical to career development processes (De Graaf & Flap, 1988; Lin, 2003; Marsden & Hurlbert, 1988), as they facilitate the flow of relevant information and helpful connections (Lin, 2001). We examine the impacts of different types of relevant social capital in three separate variables: departmental/programmatic, advisor/supervisor, and peer support. Departmental support is measured as the extent to which the individuals agreed/disagreed with the following statement: "I am encouraged by my graduate program/department to pursue my career goals". Similarly, advisor support is measured as "I am encouraged by my graduate PI/advisor/supervisor to pursue my career goals". Consistent with social capital theory, frequency of contact is a measure of network closeness (Granovetter, 1973) with implications for access to social capital resources. Peer support is measured as the frequency with which the individuals talk to their peers about their career goals (range from "never" to "weekly").

The third and final key independent variable in our study is the career interests of trainees. We include another independent variable to account for trainee interests in broad careers, particularly those interested in non-academic careers. Career interests of individuals can shape their preparedness for the job market, their relationships with their advisors/supervisors, and how much support they receive for pursuing their career goals (Mangematin, 2000; St Clair et al., 2017). As St. Clair et al. (2017) found, these interests often drive trainees to pursue different types of career development activities.

Finally, we account for a variety of demographic and background controls that may have an impact on career development strategies. These include individual's citizenship status, race/ethnicity, gender, student status (PhD student or Postdoc), and their home institution (Emory University, Georgia Institute of Technology, or Michigan State University).

RESULTS

DESCRIPTIVE ANALYSIS

Our descriptive analysis provides contextual data regarding distinctions in our respondent groups, as well as between trainees who have opted to pursue each of these sets of career development resources. Means and frequencies for our variables of interest are shown in Appendix Table A1. Here, the means and frequencies were calculated from the total N of each variable answered in the surveys.

Overall, our data are fairly evenly split between men and women. The majority are citizens (62%), and most (69%) are doctoral students. About one third are Asian (29%), and underrepresented minorities are 12% of respondents overall. As the Atlanta BEST program is larger than the MSU BEST program—the former serves trainees at two large research universities while the latter serves a single campus—in our shared sample, most trainees (roughly 75%) come from Atlanta BEST. Regarding efficacy and career interests, the majority are interested in broad careers (71%), not planning to pursue an academic career.

Trainees who selected the cohort model (BEST trainees) are primarily PhD students (76%), with over half being female and the majority being United States citizens (born or naturalized). Similarly, trainees who have pursued a cafeteria model are primarily citizens (62%) and PhD students (67%), and half of the trainees are female. Regarding race/ethnicity, more than double the number of Asians opted for a cafeteria model than a cohort model (31% and 14%, respectively), and slightly more underrepresented minorities chose a cohort model over a cafeteria model (15% as compared to 13%).

Regarding social capital resources, trainees talk to their peers about their career goals on, at minimum, a monthly basis. Importantly, this point should be interpreted carefully given that this variable varies considerably (standard deviations near 1.5 Likert scale points). Regarding advisor and departmental/programmatic support, trainees tend to agree that their advisor and department/program support their career goals, with agreement about advisers slightly stronger than department/program, although there is a fair bit of variation as indicated by the standard deviations near one Likert scale point for each.

Our descriptive data suggest that those opting for a cohort model have lower career efficacy, lower departmental/program and advisor support, and are more likely to have non-traditional career interests. In line with St. Clair et al. (2017), this suggests that variations in career development efficacy and strength of support may drive trainees to pursue different types of career development resources that support those areas.

Finally, we are also able to show that there is another group of relevant trainees: independent trainees. We found that roughly one third of PhD students and postdocs have not engaged in either the BEST program (cohort model) or other *ad hoc* career development resources (cafeteria model).

Correlations

We also ran the correlations among these variables (Appendix Table A2). Regarding social capital resources, results suggest that career development resources may be relatively distinct from one another. PI and departmental/program support are highly and positively correlated (0.67) with one another, but peer support is only slightly correlated with either of these. This suggests that faculty behaviors likely align with the culture and expectations of their department/program. These forms of support are all positively related to career goals and efficacy, though the relationships are stronger with PI and departmental/program support than with peer support. All forms of support are negatively correlated with non-traditional career goals (peer support only minimally correlated), meaning that those with nontraditional career goals perceive less support for their career goals. Further, we find modest correlations between PI and departmental/program support and career search efficacy, indicating that stronger PI and departmental/program support are positively related to higher career search efficacy.

Logistic Regressions

The descriptive results above suggest that that individuals seeking a model of career development that is designed to foster support (BEST cohort model) are more interested in pursuing broad (non-academic) careers, and also tend to report lower levels of advisor and department/program support especially for pursuing their career goals. In order to address our question of who opts for the more intensive cohort model (BEST) versus those more likely to pursue a cafeteria model, we ran a series of stepwise logistic regression models in order to control for various factors. The stepped approach allows us to isolate trainee efficacy, social capital, and non-academic career interests before combining them into a single model. Based on our results, we also partitioned the data and re-ran the models separately by trainee type (postdoc and PhD student), gender, and citizenship in order to understand if different variables explained career development resource preferences. Overall, we find that the social capital in the form of having both a supportive environment and peer support was central for determining trainees' career development model preferences. Trainees interested in careers outside of academia and/or who had low career self-efficacy were particularly attracted to cohort programs. Also, whereas trainees with high reported levels of PI support were less likely to pursue other career development resources, trainees reporting low levels of PI support were more likely to choose to participate in the BEST cohort. Trainees who reported low levels of PI, department, *and* peer support were generally less likely to participate in any type of career development.

Cohort models

Turning first to our models that examined factors important in selecting into a cohort model (enrolling in BEST) (Appendix Table A3), career goals matter. Respondents who do not intend to pursue an academic career are over two times more likely (odds ratio = 2.26) to select into the BEST program than trainees who are pursuing an academic career. Further, this effect holds as respondent career search efficacy and peer support are introduced to the model. Peer support is also important in the likelihood of selecting BEST resources, with an odds ratio of 1.34 ($p<.05$). When trainee perceptions of the extent to which their department/program and PI support their career goals are added to the model, however, career interests no longer play a significant role (and this perceived PI and departmental support are not significant either). The strength of the type of support affecting trainee decisions is evident in that it absorbs other significant effects when introduced into the model. Once departmental support was added into the model, the effect of career interests was absorbed by social capital effects. This implies that social capital, more than demographic and personal effects, is the more prominent factor in career development decisions.

In the full model, peer support remains significant, where respondents who meet more regularly with peers to discuss career interests are about one and one-half times more likely to enroll in BEST (odds ratio in full model = 1.38, $p<.05$). These results suggest that it is not simply having support

that matters, but the type of support the trainees receive. Notably, there are no differences across demographic groups in whether a trainee opts into BEST. We also partitioned the data to examine whether these factors worked differently depending on their gender and citizenship, or whether the trainee was a postdoc or PhD student. Results show that in cohort programs, peer support remains important, statistically significant, and positive for PhD students, men, and U.S. citizens, but not for postdocs, women, and non-citizens. PI support worked in the opposite way for postdoctoral fellows, where postdocs are about 47 percentage points less likely to enroll in BEST if they do not perceive that their PI is supportive of their career interests ($p<.05$).

Cafeteria models

For the models that explain respondent access to *ad hoc* (cafeteria) career development resources (Appendix Table A4), results show that, unlike above, career interests do not have significant effects for whether the trainee pursued a cafeteria model; however, the social capital resources do, and to a greater degree. In the stepped model, peer and departmental/program support have significant effects on individuals selecting cafeteria models of career development. In other words, respondents reporting closer interaction with peers in regard to career interests, and perceived support from their department/program for their career goals are more likely to have pursued *ad hoc*/cafeteria career development resources (odds ratios 1.24 and 1.25 respectively). On the other hand, perceived support of the PI is not significant. Notably, respondent efficacy specific to searching for a career is significant in each of the stepped models, although the odds are relatively small. When the cafeteria data are partitioned, results show that peer support is important in all models, for PhD students and postdocs, as well as across groups by gender and citizenship. Department/program support is significant for PhD students, women, and U.S. citizens.

While these odds ratios are relatively small, they do point to the consistent importance of this support. Across both models of all individuals, we found few demographic and background effects that drove trainee decisions to pursue cohort or cafeteria models. However, we did find that the role of social capital, career interests, and efficacy are largely driven by demographic, where certain variables are only significant in the partitioned models (when data are broken out by group). For social capital, we found peer effects to be a particularly relevant factor regarding career development decisions. For those opting into a cohort program, the strength of the contribution to the regression model made by peer support was driven primarily by males, U.S. citizens, and PhD students. For whether a trainee chose a cafeteria model, peer support mattered across all demographic groups. Thus, demographics are important in explaining why certain effects (like social capital) mattered for career resource preferences.

Lack of engagement

Finally, while it is important to understand what might differentiate trainees who pursue more intensive resources over more *ad hoc* resources (cohort vs. cafeteria), it is also helpful to know the types of characteristics of trainees that pursue neither of these resources (referred to here as independent trainees). This may help to better understand the harder-to-reach subsets of trainees who may be left out of current career development opportunities. Appendix Table A5 presents this last set of models, which show distinctly different results from the results of the other two models.

Results show that trainee career interests, whether they be academic or not, do not explain why a trainee would choose *not* to engage in the career development resources we have examined. Both career search efficacy and social capital resources are significant in these models, but in opposite ways than above. Trainees with low career search efficacy were more likely to pursue no resources (odds ratio = ~0.90), which holds in the main model.

Like other models, we found that peer support, or the frequency with which trainees discuss career interests with peers, has a significant effect for whether a trainee pursues no career development resources. Specifically, trainees who meet less frequently with their peers to talk about career goals were

more likely to pursue no resources (odds ratio = ~0.80) than those who did have more peer interaction involving career discussions. Further, while PI support is not significant for whether a trainee is independent in pursuing career development resources, perceived low departmental/program support is significant in the main model where trainees who perceive low support here are more likely to not engage in these career development resources (odds ratio = 0.81).

FINDINGS AND DISCUSSION

The purpose of this paper was to examine the factors that may explain PhD and postdoctoral trainee preferences for different sources of career development resources. Our findings, as discussed below, underscore the importance of supportive relationships in the trainee experience, but in ways that have not been addressed in the existing literature. While psychosocial support has been shown to be important in shaping confidence and satisfaction among students (Blake-Beard et al., 2011; Curtin et al., 2016), we find that it also shapes the way that doctoral and postdoctoral trainees pursue career development resources. Based on our results, we offer the following findings.

First, with changing career expectations of doctoral and postdoctoral trainees who may not be interested in an academic career (Alberts et al., 2014; Fox & Stephan, 2001; Sauermann & Roach, 2015; Thiry et al., 2015), finding like-minded colleagues who can support the pathways to broader career options may seem difficult in academic institutions that have a long-standing tradition of preparing doctoral graduates and postdocs for the professoriate. Our results also show trainees with broad career interests are more likely to enroll in formal, cohort based career development programs such as BEST, where they likely can find a community of support to collaboratively, and continuously, explore career options. The attraction may be, at least in part, the opportunity for more interpersonal psychosocial support and resources that come from having such a community with common goals and interests (e.g. Blake-Beard et al., 2011; Lin, 2001). Notably having broad career interests played no significant role in whether trainees pursued a cafeteria model or were likely to do nothing at all (independent trainees who neither enrolled in BEST nor sought *ad hoc* resources).

Second, it is well established that social capital matters for career and other professional outcomes (e.g., Lei et al., 2011; Lin, 2001), which our results demonstrate. Our analysis shows social capital plays an important role in trainee career development and is the strongest and most consistent predictor of deciding (or not) to pursue different types of career development decision models. Trainees who report strong peer support for their career interests are likely to pursue either a cohort or *ad hoc* model, while those with less support were likely to pursue no career resources at all. Further, the fact that interest in broad careers, as well as a supportive set of peers were important in whether a trainee sought the BEST cohort model, suggests these trainees are indeed seeking a community of like-minded individuals who are also interested in exploring and learning more about careers available to them.

In our analysis we also explored the importance of the "constellation" of social network ties relevant to doctoral trainee development, specifically their PI and other faculty (Golde & Dore, 2001) who do support (or do not) participation in different types of career activities. Interestingly, perceived support from one's PI has no effect on trainee preferences for career resources, with one exception. For postdocs, lack of PI support was important in whether they sought out the cohort model, consistent with the notion of needing a community with similar interests to offer support not found elsewhere (Curtin et al., 2016; Wegner et al., 2002). A supportive environment (departmental/program support) is important for trainees to seek out specific *ad hoc* resources, while a less supportive environment appears to be detrimental, where trainees are not likely to pursue any career development resources at all. This nuance bears further attention, though one possible interpretation is that trainees who feel supported and empowered by their PI and/or department may feel more confident in seeking out other areas of support, while trainees who identify a lack of support may feel that they are alone in their career development and do not explore. Another possible explanation is supported by Social

Capital Theory: for well-supported trainees, access to career development information may be supplied by supportive PIs while unsupportive PIs may not share resources at all.

Third, and perhaps most importantly, our research highlights the role of peer support as a form of social capital, contributing to other work in this area (Wegner et al., 2002). Overall, career-related resources, including new information and connections (Lin, 2001) and psychosocial support have the potential to shape a trainee's job search process and career development (Lent & Brown, 2013; Seibert et al., 2001). For doctoral students and postdocs, the role of social capital may be of vital importance to seeking informal sources of support, and it aids in countering perceptions of isolation and diminished confidence that some trainees experience (Ali & Kohun, 2007; Blanchard, 2018; Jairam & Kahl, 2012). We found peer support to have both stronger and more universal effects across all models, while other forms of support (e.g., PI or departmental/program support) were less consistent across the models. Having close ties with peers seems to provide trainees the foundation to pursue either specific *ad hoc* resources (a cafeteria model), or engage with formal BEST cohort programs. Conversely, trainees reporting lower levels of peer support are more likely to not pursue any formal career development resources.

Finally, the extent to which trainees have confidence in their career development process also matters for some trainees, both positively but also constraining some trainees from seeking resources that may benefit them. For trainees seeking a cohort model, their confidence in their career development played no role in whether they sought this community model. Instead, other factors were more important, as noted above. Conversely, trainees with more confidence in their own career search abilities are more likely to seek out specific resources in an *ad hoc* manner. We know that the psychosocial support that a trainee receives can affect this confidence (Littlefield et al., 2015; Maher et al., 2018); but if the individual's efficacy was already high, the need for a community to offer such resources to enhance efficacy may not be necessary. Trainees with confidence in their own career search abilities are more likely to seek out specific resources in an *ad hoc* manner, perhaps suggesting they are confident and supported in learning about specific activities or information they lack and then demonstrate the agency to seek them out.

CONCLUSION

Based on our results, we offer a few conclusions relevant to meeting the career development needs of doctoral and postdoctoral trainees.

First, above all and consistent with prior studies (e.g., Weidman & Stein, 2003), our research shows that social capital matters for types of career development resources doctoral and postdoctoral trainees pursue, or do not pursue, regardless of other factors like career preferences. Certain forms of social capital may not necessarily be formative of preferences, but a reinforcement. Therefore the role of social capital in this scenario was not whether it led trainees to one option over another, but rather feelings of support from peers that affected decision-making by allowing for exploration and strengthening pre-existing ideas or wants. Knowing that peers influence the types of career development resources trainees choose to pursue, and how they pursue them, it is important to highlight to them the power of leveraging peer networks, as well as providing peer interaction and communities that trainees can regularly participate in outside of their primary academic and research environments.

Second, there are groups of trainees who lack the support and resources to pursue their career interests and who fail to seek assistance. While our interests were primarily in how trainees choose between a more intensive versus an *ad hoc* approach to accessing career development resources, the fact that low confidence explained whether a trainee pursued no career development resources at all highlights a group of individuals who may fall through the cracks. This presents a new population for study, because it suggests the support and efficacy an individual receives (or perceives to receive) may

exist on a sliding scale, where for some individuals, being too far down on that scale of support leads to no trainee action.

Finally, as a result of the above, doctoral and postdoctoral trainees with broad career interests may benefit from a specifically-crafted program to support these interests. With changing career expectations of doctoral and postdoctoral trainees who may not be interested in an academic research career, finding like-minded colleagues who can discuss and support pathways to broader career options may seem difficult in academic institutions that have a long-standing tradition of preparing trainees for the professoriate. Our findings suggest there exists a population that could likely benefit from institutional encouragement to consider the benefits of investigating career development resources. As institutions continue to look at their campuses and populations whose needs are not being met, they will find there are many local resources to help trainees in their career exploration process, outside of traditional faculty advisors, for example, alumni and local practicing professionals found through public sites such as LinkedIn. Given its overall mission, the cohort-based career development model provides important additive value in the form of peer and faculty relationships that is appreciated and has positively affected many trainees.

Overall Implications

Our study fills a niche in a few key ways. First, we assess postdoctoral fellows as well as doctoral students, a population not as commonly studied in the context of career development; much extant literature focuses on career development for undergraduates. Second, our quantitative approach enables us to compare trainee cohort members to non-cohort members. The vast majority of literature in this field, perhaps because of its qualitative nature, neglects to compare cohort members to non-cohort members. This study cannot single-handedly fill the gap; therefore, a more concerted effort among researchers is necessary to better understand empirically the differences among education models, and we believe this is especially important because of the growth in graduate career development training available across U.S. campuses. Third, our study population comes from a variety of biological, biomedical, and engineering departments across three institutions. We are thus able to control for institutional as well as various demographic characteristics, which has been recognized as a significant need in cohort model research (Bista & Cox, 2014). Our findings show distinct differences between the trainees who participate in the *ad hoc* cafeteria model as compared to those that have aligned with a cohort program.

Policy and programming implications

Our research suggests that trainees pursue different models of career development and do so for different reasons. Knowing that the effect of peers is strong, marketing these programs and structuring them to reinforce the peer effect may be beneficial. However, knowing that peer support is not always a positive factor for individuals to pursue career development opportunities, gaining support of PIs and departments/programs or specifically tailoring and marketing programming toward those with broad career goals may help attract those individuals who may be hard to recruit into career development programs.

Limitations

As with all studies, our study has limitations. First and foremost, our data came from a survey that was implemented by an evaluation organization external to the NIH. This survey was designed to address the program from an evaluative perspective and, therefore, offered a limited set of variables for us to assess. Particularly, we were limited in the types of resources that trainees pursued for career development, beyond what BEST cohort members were offered. This could potentially skew our findings, as individuals may pursue resources that we were not able to measure, such as internship connections or previous employer contacts. Second, the universities that participated in BEST had

flexibility in how they structured their programs. Thus, types of career development activities could vary greatly between the Atlanta and Michigan State BEST programs.

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APPENDIX

Table A1: Descriptive Results

	All Trainees			PhD Students			Postdocs			BEST Trainees			Cafeteria Trainees		
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Career Development Preference															
BEST Trainees	1,215	5%	0.22	843	6%	0.24	372	4%	0.20	-	-	-	-	-	-
Café Trainees	1,215	60%	0.49	843	58%	0.49	372	64%	0.48	-	-	-	-	-	-
Indpt Trainees	1,215	35%	0.47	843	36%	0.48	372	32%	0.46						
Career Interests and Efficacy															
Broad Career Interests	1,140	71%	0.46	794	74%	0.44	346	63%	0.48	65	85%	0.36	691	71%	0.46
Career Development Efficacy	1,188	13.74	3.01	825	13.62	2.96	363	14	3.12	65	13.09	3.29	710	14.1	2.78
Social Capital															
Peer Supt	1,149	4.47	1.40	798	4.571	1.29	351	4.22	1.57	66	4.86	1.01	695	4.62	1.29
Advisor Supt	1,072	3.92	1.00	724	3.89	0.98	348	3.97	1.05	66	3.5	1.14	650	3.99	0.97
Dept Supt	1,118	3.74	1.04	773	3.819	1.01	345	3.55	1.09	66	3.38	1.05	672	3.83	1.02
Demographics															
Citizens	1,094	62%	0.49	762	72%	0.45	332	39%	0.49	63	78%	0.42	658	62%	0.49
Females	1,095	49%	0.50	762	50%	0.5	333	46%	0.50	64	58%	0.5	657	50%	0.5
URMs	1, 215	12%	0.33	843	13%	0.34	372	11%	0.31	66	15%	0.36	723	13%	0.33
Asians	1,215	29%	0.46	843	25%	0.44	372	39%	0.49	66	14%	0.35	723	31%	0.46
Institution (Atl)	1,215	73%	0.44	843	66%	0.47	372	90%	0.31	66	73%	0.45	723	74%	0.44
PhD Students	1,215	69%	0.46	-	-	-	-	-	-	66	76%	0.43	723	67%	0.47

Table A2: Pearson Correlations

	BEST Trainees	Cafe Trainees	Indpt Trainees	Broad Career Goals	Career Search Efficacy	Peer Supt	PI Supt	Dept Supt	Females	URMs	Asians	Citizens	PhD Students
BEST Trainees	1												
Cafe Trainees	-0.29**	1											
Indpt Trainees	-0.18**	-0.89**	1										
Broad Career Goals	0.08**	0	-0.04	1									
Career Search Efficacy	-0.05	0.15**	-0.12**	-0.13**	1								
Peer Supt	0.07*	0.14**	-0.18**	0	0.11**	1							
PI Supt	-0.11**	0.09**	-0.04	-0.18**	0.28**	0.09**	1						
Dept Supt	-0.09**	0.11**	-0.07	-0.16**	0.33**	0.14**	0.67**	1					
Females	0.05	0.02	-0.04	0.10**	-0.08**	0.02	-0.01	0.01	1				
URMs	0.02	0.01	-0.02	-0.02	0.02	0.04	-0.05	-0.04	0.11**	1			
Asians	-0.08**	0.04	0	-0.04	0.01	-0.15**	-0.09**	-0.06	-0.17**	-0.20**	1		
Citizens	0.08**	0	-0.04	0.12*	-0.01	0.23**	0.12**	0.18**	0.18**	0.06*	-0.58**	1	
PhD Students	0.03	-0.06*	0.04	0.11**	-0.06**	0.12**	-0.04	0.12**	0.04	0.03	-0.14**	0.31**	1

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

Table A3: Logistic Regression: Trainee Preference for Cohort Model (Odds Ratios)

	Basic Model	Career Interest Model	Efficacy Model	Peer Social Capital Model	Full Model	PhD Students	Postdocs	Females	Males	Citizens	Non-Citizens
Career Interests and Efficacy											
Broad Career Interests		2.26*	2.13*	2.22*	1.91	2.47	2.53	2.43	1.70	1.68	3.52
Career Search Efficacy			0.95	0.94	0.98	1.03	0.89	1.06	0.91	1.02	0.86
Social Capital											
Peer Supt				1.34*	1.38*	1.47*	1.26	1.20	2.00**	1.45*	1.33
Dept Supt					0.88	0.71	1.47	0.75	1.03	0.84	0.89
PI Supt					0.72	0.88	0.47*	0.73	0.71	0.75	0.69
Demographics											
Females	1.26	1.13	1.16	1.18	1.25	1.02	2.20			1.02	2.25
URMs	0.81	0.87	0.90	0.89	0.84	1.01	0.38	0.94	0.59	0.82	1.24
Asians	0.40*	0.42*	0.43	0.43	0.44	0.44	0.35	0.34	0.51	0.29	0.64
US Citizens	1.27	1.28	1.28	1.10	1.28	1.34	1.17	0.88	1.72		
Institution (Atl)	1.29	1.22	1.21	1.17	1.09	1.77	0.12**	0.79	1.55	1.33	0.55
PhD Students	1.37	1.33	1.27	1.23	1.34			0.97	2.07	1.60	0.74
Constant	0.04***	0.02***	0.04***	0.02***	0.04**	0.01**	0.80	0.12	0.01**	0.03**	0.23
Observations	1,087	1,066	1,065	1,061	956	651	305	460	496	596	360

*** p<0.001, ** p<0.01, * p<0.05

Table A4: Logistic Regression: Trainee Preference for Cafeteria Model (Odds Ratios)

	Basic Model	Career Interest Model	Efficacy Model	Peer Social Capital Model	Full Model	PhD Students	Postdocs	Females	Males	Citizens	Non-Citizens
Career Interests and Efficacy											
Broad Career Interests		0.97	1.05	1.09	1.13	1.11	1.16	1.25	1.03	1.27	0.96
Career Search Efficacy			1.09***	1.08**	1.05*	1.05	1.07	1.06	1.04	1.04	1.08
Social Capital											
Peer Supt				1.22***	1.24***	1.21**	1.28**	1.28**	1.21**	1.16*	1.30***
Dept Supt					1.25*	1.36**	1.08	1.31*	1.18	1.33*	1.13
PI Supt					0.99	0.88	1.22	0.94	1.06	0.98	1.05
Demographics											
Females	1.12	1.11	1.14	1.14	1.19	1.12	1.49			1.10	1.31
URMs	1.11	1.13	1.09	1.07	1.10	1.15	0.86	1.18	0.94	1.38	0.56
Asians	1.33	1.36	1.35	1.36	1.26	1.25	1.31	1.36	1.20	1.68	0.88
US Citizens	1.27	1.32	1.29	1.14	1.02	0.91	1.26	0.92	1.07		
Institution (Atl)	1.01	1.02	0.98	0.96	0.99	0.94	1.24	1.25	0.77	1.12	0.76
PhD Students	0.72*	0.69*	0.71*	0.66**	0.64**			0.59*	0.69	0.51**	0.75
Constant	1.40	1.47	0.45*	0.23**	0.14***	0.14**	0.05**	0.12**	0.21*	0.18*	0.15*
Observations	1,087	1,066	1,065	1,061	956	651	305	460	496	596	360

*** p<0.001, ** p<0.01, * p<0.05

Table A5: Logistic Regression: Trainee Pursues NO Career Development (Independent Trainees) (Odds Ratios)

	Basic Model	Career Interest Model	Career Search Efficacy Model	Peer Social Capital Model	Full Model	PhD Students	Postdocs	Females	Males	Citizens	Non-Citizens
Career Interests and Efficacy											
Broad Career Interests		0.88	0.82	0.78	0.78	0.74	0.74	0.64	0.89	0.66	0.93
Career Search Efficacy			0.93**	0.94**	0.95*	0.94*	0.95	0.91*	0.97	0.94	0.94
Social Capital											
Peer Supt				0.77***	0.75***	0.75***	0.74**	0.72***	0.77***	0.77***	0.74***
Dept Supt					0.81*	0.80	0.86	0.83	0.83	0.78	0.89
PI Supt					1.13	1.23	0.93	1.23	1.01	1.16	1.02
Demographics											
Females	0.84	0.87	0.84	0.83	0.77	0.86	0.58			0.87	0.66
URMs	0.95	0.92	0.94	0.97	0.96	0.87	1.44	0.85	1.20	0.90	1.81
Asians	0.88	0.85	0.86	0.85	0.94	0.97	0.89	0.98	0.92	0.82	1.23
US Citizens	0.74	0.71	0.72	0.86	0.93	1.05	0.75	1.14	0.84		
Institution (Atl)	0.93	0.94	0.98	0.99	0.96	0.90	1.58	0.81	1.19	0.79	1.40
PhD Students	1.33	1.40*	1.38*	1.50*	1.50*			1.78*	1.32	1.81*	1.36
Constant	0.62*	0.65	1.92	4.51**	5.61**	7.20**	7.06*	5.54*	4.28*	5.46*	3.91
Observations	1,087	1,066	1,065	1,061	956	651	305	460	496	596	360

*** p<0.001, ** p<0.01, * p<0.05

BIOGRAPHIES

Dr. Rebekah St. Clair received her doctoral degree in 2019 from the Georgia Institute of Technology in the School of Public Policy. Her specialties are in Organization Theory and Quantitative Methods, with research interests in the organizational factors that affect performance and outcomes.

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