Using Social Network Analysis to Assess Professional Network Development among AGE*SW* Pre-Dissertation Fellowship Program Participants

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Abstract

Professional networks are important for the success of doctoral students and early career faculty members, yet there is little research about what types of experiences help emerging scholars develop these networks. Social network analysis may be an ideal method for studying the effectiveness of training programs in nurturing network development among emerging scholars. We describe one application of this method, which was used to examine the professional networks formed through participation in the Association of Gerontological Education in Social Work (AGESW)'s Pre-Dissertation Fellowship Program (PDFP). Alumni (n = 12) from the first three cohorts of the program (2010-2012) reported meeting an average of 20 scholars (SD = 13.2) through AGESW, which led to potential professional interactions and collaborations on conference presentations and manuscripts. Although challenges with missing data limited the conclusions that can be drawn, we find that this method holds promise for helping to identify key factors that facilitate professional network development in pre-dissertation training programs such as the PDFP.

Keywords: AGESW, predoctoral training, PhD socialization, academic professional networks, program evaluation

Introduction

As highlighted elsewhere in this special section, the field of social work faces a critical shortage of students and faculty with expertise in gerontology. New strategies to recruit, train, and retain practitioners and researchers in this field are urgently needed. To this end, in 2010, the Association for Gerontological Education in Social Work (AGE*SW*) established the Pre-Dissertation Fellowship Program (PDFP) to help recruit, train, and support social work doctoral students focusing on issues of aging and older adults (see Gibson et al., 2019 for a further discussion of the history of the program). The PDFP provides workshops, mentorship, and networking opportunities to help students successfully complete their doctoral studies, find employment in social work education programs, and train future gerontological social workers and researchers.

In their home institutions, PDFP fellows' faculty mentors may have expertise in aging-related research and teaching, but may lack classmates and other faculty members with similar interests. Indeed, one focus of the PDFP is to support students "who are at social work schools that do not have an abundance of support and resources…in the area of gerontology" (Sanders, Anderson, Berg-Weger, Kaplan, & Schroepfer, 2017, p. 331). By providing opportunities to form relationships with scholars outside the fellows' institutions, the PDFP aims to fill a critical role in the development of PDFP fellows' professional networks.

Professional networks consisting of scholars who provide information, support, introductions, or collaboration are important to doctoral students and junior faculty. Lubben and Harootyan (2003) noted that without connection to faculty with similar interests, students lack mentorship in accessing aging-related resources, lectures, conferences, and the broader community of gerontological scholars. Doctoral students have reported gaining academic

knowledge and skills, receiving support, and developing professionally through their scholarly networks (Pilbeam, Lloyd-Jones, & Denyer, 2013). For tenure-track faculty, off-campus networks can provide potential collaborators, award nominations, presentation and funding opportunities, and external reviewers for tenure dossiers (Niehaus & O'Meara, 2015). In a study of 143 American academics, those who reported having at least one colleague who helped their career within the first five years, had more publications in their early and mid-career, and those with an emotionally close supportive colleague demonstrated higher salaries in their mid-career (Kirchmeyer 2005). Professional relationships have also been found to increase the likelihood of an academic being hired and receiving tenure or promotion (Godechot, 2016; Lutter & Schröder, 2016; Zinovyeva & Bagues, 2015).

In 2018, research entailing a retrospective survey of PDFP alumni from the 2010 to 2016 cohorts was conducted to evaluate aspects of the PDFP (Kusmaul et al., 2019). One of the study's research questions addressed the long-term effects of the program on alumni's career development. A key finding was that a large majority of the PDFP alumni agreed that the program had expanded their professional networks and that these networks enhanced their career development (Kusmaul et al., 2019).

In order to better examine the key factors that facilitate professional network development in programs such as the PDFP, the use of specialized methods is often useful. For example, social network analysis is a methodology that allows researchers to investigate details about the composition and structure of individuals' networks of social relationships (Wasserman & Faust, 2005). Social network analysis has been used in a variety of ways in program evaluation studies including to identify patterns of communication between agencies (Gillieatt, Fernandes, Fielding, Hendrick, Martin, & Matthews, 2015), assess capacity-building among

nonprofit organizations (Johnson, Honnold, & Stevens, 2010), and assess organizational ties within a coalition (Freedman & Bess, 2011). Likewise, it has also been used to examine students' social ties such as graduate students' peer relationships (Morimoto & Yang, 2013), medical students' support networks, (Vaughan, Sanders, Crossley, O'Neill, & Wass, V., 2015), and international students' social connectedness (Hendrickson, Rosen & Aune, 2011).

This manuscript presents information about designing, conducting, and analyzing data for social network analysis research in program evaluation. It uses the example of a social network analysis we conducted to examine the types and magnitude of professional networks that PDFP fellows built through their association with AGESW (i.e., "AGESW-related network"). We discuss the challenges and potential benefits of using social network analysis and present results of PDFP network analysis.

Method

Social network analysis can be a useful tool in program evaluation, particularly when evaluating the types and extent of relationships fostered by a fellowship program such as the PDFP. In this section, we present general information about conducting social network analysis for program evaluation and describe the method used in the network analysis of PDFP alumni.

Social Network Analysis Methodology

There are two main approaches to research design in social network analysis -- egocentric and sociocentric. In an *egocentric* approach, individuals are sampled from a population and asked about the people with whom they have relationships (Perry, Pescosolido, & Borgatti, 2018). Each individual surveyed is called an *ego* and the individuals with whom they have social ties are the egos' *alters*. In egocentric approaches to social network analysis, each ego may have a unique set of alters who are not known to the other egos in the study. In a *sociocentric*

approach, an entire set of individuals within a social boundary (e.g., club, classroom, or work unit) are considered a complete network and all individuals within the bounded network are invited to report on their relationship(s) with each other individual in the network. The sociocentric approach allows researchers to conduct sociometric analyses in which the structure of the entire network is determined from the combined responses of all network members. Sociometric network analyses allow for complex investigations of network structure, but can be limited by restricting other network members to only those within the predefined network boundary (Perry et al., 2018). In either approach, attributes of the egos and alters can be considered as important predictors or outcomes of the network's characteristics.

Social network analysis can investigate a variety of types of social connections, or *ties*. Borgatti, Everett, and Johnson (2018) present a taxonomy of types of ties that distinguishes between *relational states* and *relational events*. Relational states can include similarities such as living in the same neighborhood, participating in the same events, or having similar characteristics. Relational states can also include relational roles such as "brother" or "teacher" and relational cognitions such as "liking" or "knowing" another person. The second main type of social ties is relational events. These include interactions such as "discussed current events" and flows such as "advice given" or "money borrowed." Ties can be operationalized as *binary*, representing the existence or non-existence of a particular type of tie, or as *valued*, in which the social tie carries a weight that could be based on frequency, intensity, duration, etc.

When using social network analysis for program evaluation, the choices of egocentric or sociocentric research design, what types of attribute data to collect for egos and alters, what types of social ties to explore and how to measure them are driven by the theoretical model of the program and research questions of the evaluators. If there is a network with clear boundaries

such as participants in a particular program or organizations in a coalition, conducting a sociometric network analysis may be ideal. This approach allows for sophisticated analyses of the structure of the entire network (e.g., cohesion or the existence of a core-periphery structure), subgroup analyses, and more types of individual-level analyses than egocentric designs (Perry et al., 2018, Wasserman & Faust, 2005). Evaluators may wish to value ties by measuring the strength of ties with Likert-type scales that ask participants to rate the strength of a tie, their satisfaction with the relationship, or other types of ordinal values for the tie (Robins, 2015). Ties can also be valued according to empirical measurements such as number of emails sent or days since being introduced. Using valued ties can enhance the level of nuance in analyses, but may come at the expense of respondent burden (Robins, 2015).

How the PDFP Network Analysis was Conducted

The PDFP network analysis employed a blended egocentric/sociometric, cross-sectional retrospective social network analysis to assess the professional relationships that PDFP alumni reported having developed with other aging-related scholars as a result of their involvement in the program. In this study, we examined professional ties that represent relational states as well as those that reflect relational events. From March to May 2018, alumni from the 2010-2012 PDFP cohorts completed an online survey using Qualtrics survey software. The study was approved by the Institutional Review Board at the University of Maryland Baltimore County.

Recruitment and sample for the PDFP network analysis. PDFP alumni from 2010-2012 ($N = 30$) were eligible for participation in this study. The inclusion criteria specified alumni from the first three cohorts in order to focus on scholars who were most likely to have graduated from their doctoral programs and be in faculty positions. Alumni from subsequent cohorts might

still have been in their PhD programs and focusing on dissertation research and research in their own institutions rather than collaborating with scholars from other institutions.

In March 2018, a PDPF co-director sent an email to all 2010 to 2012 PDFP alumni describing the study and inviting them to participate. The invitation to participate in this study was the second in a series of recruitment emails the alumni received regarding studies of the PDFP. The first invitation was for a 38-question online survey examining effects of the PDFP in alumni's career development that was sent to all 2010-2016 cohort alumni (Kusmaul et al., 2019).

For this social network analysis study, the alumni were offered no incentives, but were informed their participation could help explore the program's impact on gerontological social work doctoral education and inform program improvement efforts. A follow-up invitation was emailed in April 2018. A total of 12 (40%) alumni distributed across the three eligible cohorts (n = 4, 40% from 2010 cohort; n = 5, 50% from 2011 cohort; n = 3, 30% from 2012 cohort) participated in the study.

Measures used in the PDFP network analysis.

The PDFP social network analysis measured the alumni's network members and several specific types of professional ties.

***Network members*.** To assess the *alters* (i.e., people the respondents had a professional relationship with) of the survey respondents, the survey provided a roster of gerontological social work scholars' names from which to choose. The roster was divided into two sections containing: (1) the names of all the AGE*SW* board members and presenters at PDFP trainings from 2010 to 2012 (N=22) and (2) the names of all 30 PDFP alumni from the 2010-2012 cohorts. From this roster, respondents selected the names of anyone they had met "*at an AGESW*

sponsored event (i.e., CSWE, GSA, AGESW receptions or during the AGESW PDFP meetings), through your AGESW connections –or– as a result of your AGESW involvement." In addition to this roster that was pre-filled with the names of AGESW-related scholars, an open-ended question gave respondents the opportunity to select "Other" and write in the names of additional scholars they had met in these ways.

This method of collecting the respondents' alters blends egocentric and sociocentric approaches. To the extent that respondents from the 2010 to 2012 cohorts selected one another and reported on the relationships they had within the network of the 2010-2012 PDFP alumni, the approach was sociocentric. This design was selected to enable complex analyses on the structure of the network of early PDFP alumni. In the second section where respondents selected board members, presenters, and "Other" scholars they wrote in, an egocentric approach was utilized. This enabled analyses of the broader networks of the individual alumni beyond the limitations of the predefined network members from the early cohorts.

Professional ties. From the list of names each respondent had met through AGE*SW*, respondents indicated specific types of professional ties they had with each scholar. The ties selected were based on previous literature describing levels of collaboration (Himmelman, 2001) and types of professional relationships that were salient for early career academics (Niehaus & O'Meara, 2015; Pilbeam et al., 2013; Zinovyeva & Bagues, 2015). We elected to measure ties that represented both relational cognitions and relational events (Borgatti et al., 2018) and chose a spectrum of relationship ties from modest interactions or potential interactions to more impactful ties such as collaboration on a manuscript. By including this spectrum of ties, we intended better to understand the value of the professional ties PDPF alumni formed through AGE*SW*. A de-identified example of the customized questionnaire is provided in Figure 1.

Figure 1. Questionnaire matrix assessing relationship ties between AGESW Pre-Dissertation Initiative Alumni and individuals they met through AGESW-related activities.

	I would be able to contact this person for a question (e.g., about a research study or a class they are teaching)	I would feel comfortable introducing this person to another colleague	COMMUNICATION – I have communicated with this person since meeting through AGESW	CONFERENCE PRESENTATION COLLABORATION – I have collaborated with or am currently planning a collaboration on a conference presentation	MANUSCRIPT COLLABORATION – I have collaborated with or am currently planning a collaboration on a manuscript	None	Choose not to answer
Name 1	□	□	□	□	□	□	□
Name 2	□	□	□	□	□	□	□
Etc.	□	□	□	□	□	□	□

Note: The names in this questionnaire matrix were populated from names selected from a roster and provided on an open ended question through a name generator question in previous questions on the survey.

Potential professional interactions are relational cognitions that we conceptualized as the alumni's assessments that they could leverage the relationship for professional reasons. They were assessed with two items: (1) "I would be able to contact this person for a question (e.g., about a research study or a class they are teaching)" and (2) "I would feel comfortable introducing this person to another colleague."

We also measured relational events of communication and collaboration. A single item assessed *communication* ties: "I have communicated with this person since meeting through AGE*SW*." Two types of *collaboration* were assessed: (1) conference presentation collaborations, "I have collaborated with or am currently planning a collaboration on a conference presentation" and (2) manuscript collaborations, "I have collaborated with or am currently planning a collaboration on a manuscript."

Missing data in the PDFP network analysis. Sociometric network analysis is sensitive to missing data which can arise from non-response or from respondents not completing questions on the survey. Missing data from both sources should be less than 20% of the total network to

avoid biased results (Kossinets, 2006). By contrast, in egocentric designs, lack of participation is not considered missing data because the goal is not to collect data about ties in a pre-defined bounded network. However, in egocentric designs, there is a concern for nonresponse bias just as in other survey research (Dillman, Smyth, & Christian, 2014).

In the PDFP social network analysis, there were missing data from a respondent who did not complete all the survey items. One of the respondents selected "choose not to answer" for three of the selected individuals. This represented 33% of the respondent's personal network and 1.2% of the entire set of scholars met through AGE*SW* (i.e., 3 of the 258 individual nominations from the 12 respondents).

Analysis for the PDFP network analysis. The original analytic plan for the PDFP network analysis included a sociometric analysis of the network of 2010-2012 PDFP alumni and egocentric analyses of the broader networks beyond the cohorts. As a result of the low response rate, sociometric analyses were not conducted. For the egocentric analyses, the number of aging-related scholars met through AGE*SW* were counted for each respondent and type of tie. Descriptive statistics for the sample as a whole and by cohort were also calculated. To preserve confidentiality, demographic information was not included in the analysis.

Results of the PDFP Social Network Analysis

Findings from a social network analysis can provide rich, contextual information about the nature of social relationships. In the PDFP network analysis, we evaluated the types and size of professional networks reported by members of the 2010-2012 PDFP cohorts. This approach held the promise to expand on the findings from our previous study (Kusmaul et al., 2019) to delineate specific types of ties (i.e., relational cognitions associated with the level of comfort within a social tie and relational events such as communication and collaborations). The results

of the PDFP social network analysis presented below provide an example of the types of findings an egocentric social network analysis can produce.

Sample

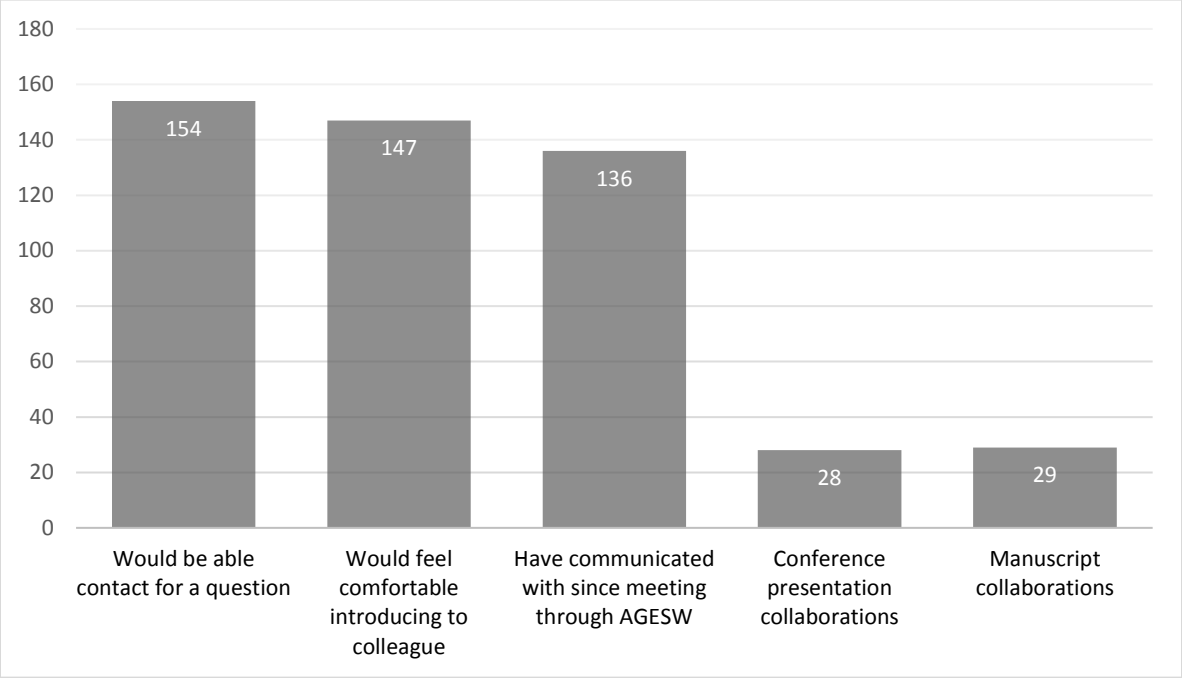
Forty percent (n = 12) of eligible PDFP alumni completed the survey. They were distributed across cohorts. All had completed their PhD, and all but two were employed in academic positions.

Professional Networks Built

On average, respondents reported approximately 20 scholars (M = 19.9, SD = 13.2, min = 4, max = 42) in their AGE*SW*-related networks, including almost nine board members or presenters (M = 8.8, SD = 5.7). The AGE*SW*-related networks included professional ties that could be leveraged in the future or actual communication or collaboration. On average, respondents reported at least one of the specified professional ties with a majority (61.3%, SD = 37.5%) of the scholars they had met through AGE*SW*. This network building was not universal, however; two respondents (16.7%) reported no professional ties with any of the individuals they had met through AGE*SW*.

Types of professional ties. All five types of professional ties were represented in the alumni's AGESW professional networks. Within their AGESW-related networks, a substantial majority of respondents (83.3%) had met someone they felt they could contact in the future and two-thirds had met someone they would feel comfortable introducing to a colleague. Communication with scholars in their AGESW-related network was reported by three-quarters of respondents, and collaborations by around half (50% on a manuscript and 58.3% on a conference presentation). Figure 2 provides details about the number of AGESW-related network professional ties.

Figure 2. Total number of professional relationship ties among AGESW Pre-Dissertation Alumni from 2010-2012 cohorts (*N* = 12).



Potential professional interaction ties were the most common type of tie. On average, respondents indicated they would be able to contact or would feel comfortable introducing 13.6 individuals (*SD* = 12.9) to a colleague (range = 0 to 36). The average number of scholars the PDFP alumni reported having communicated with (10.6, *SD* = 11.4, range = 0 to 32) was similar to the number they indicated they would potentially contact (11.5, *SD* = 11.6) or introduce to a colleague (10.9, *SD* = 12.6). The rarest type of professional tie was collaboration; nonetheless, over half (*n* = 7, 58.3%) reported having collaborated with someone in their AGE*SW*-related network and one respondent had collaborated with 10 different scholars. The average number of collaborators was 2.8 (*SD* = 3.8).

Cohort differences. Table 1 presents results by cohort for the three PDFP cohorts. On average, the 2010 cohort members (*n* = 4) met 32 aging-related scholars (*SD* = 11.8) through their participation in AGE*SW*. In contrast, the 2011 cohort members (*n* = 5) reported meeting

approximately half as many individuals (M = 16.8, SD = 10.2), and the 2012 cohort members (n = 3) reported less than a third as many (M = 8.7, SD = 4.5). This pattern held for each of the five types of professional ties.

Table 1. Size of professional networks met through AGESW of participants in AGESW Pre-Dissertation Initiative 2010-2012 cohorts (N = 12) by cohort.

	2010 Cohort n = 4		2011 Cohort n = 5		2012 Cohort n = 3	
	M	*SD*	*M*	*SD*	*M*	*SD*
Individuals met through AGESW	32.3	11.8	16.8	10.2	8.7	4.5
Type of professional relationship tie						
Would be able to contact	21.3	11.0	10.0	9.8	1.0	1.7
Comfortable introducing to colleague	20.3	14.4	10.0	10.3	0.0	0.0
Communicated with	21.3	9.4	8.4	9.3	0.0	0.0
Conference presentation collaboration	4.0	3.4	2.0	3.4	0.0	0.0
Manuscript collaboration	4.3	2.5	2.2	3.8	0.0	0.0

Extended networks. Fifty percent of the sample (n = 6) reported meeting scholars who were not formally involved in the PDFP (i.e., *extended network*). In total, the respondents reported meeting 26 other such aging-focused scholars (M = 2.5, SD = 3.0, range = 0 to 7). In spite of only accounting for a small portion of each alumni's personal AGE*SW*-related network (M =11.2%, SD = 13.8%), these introductions were associated with six conference presentation collaborators ties and nine manuscript collaborators.

Discussion

As the results of this PDFP study demonstrate, social network analysis can provide details about the types and magnitude of social networks beyond the scope of traditional survey research. Other studies using social network analysis studies have produced a variety of results that can inform program evaluations. For example, a social network evaluation of peer relationships among MSW students tracked the development of students' networks across the

course of the first semester of the program and found the network were more racially and ethnically diverse at the end of the semester compared to the middle of the semester (Mauldin, Narendorf, & Mollhagen, 2017). Other studies have used social network analysis to assess information sharing or collaboration and make recommendations for improvements (Carman & Fredericks, 2018). As we and others (Carman & Fredericks, 2018) have experienced, social network analysis is a powerful yet challenging methodology.

Results of the Social Network Analysis to Evaluate the PDFP

Our examination of the AGE*SW*-related professional networks among PDFP alumni suggests program participants formed professional relationships through their involvement with AGE*SW*. The PDFP introduces emerging scholars to established AGE*SW* members in training environments. Interactions at workshops as well as social events may foster connections among PDFP participants and serve as an *entrée* into the larger AGE*SW* network. Although this study does not intend to generalize beyond the PDFP, it may help inform the development of evidence about doctoral training programs' support of professional networking.

In related evaluations of the PDFP, alumni reported that the program contributed to the development of their professional networks (Gibson et al., 2019; Kusmaul et al., 2019). However, neither of the studies enumerated specific types of professional ties such as the relational cognitions and events this manuscript reports. By using social network analysis, this study found differences across types of professional ties that are potentially revealing. Over half of the respondents reported having collaborated on a manuscript or conference presentation with someone they met through AGE*SW*. This is promising because peer-reviewed dissemination of research is important for securing an academic appointment and, later, for earning tenure and promotion. Nonetheless, collaboration was the least frequently endorsed type of tie among

alumni. This is not unexpected given the time- and resource-intensive nature of collaboration, and previous literature suggesting collaboration is less common that communication in professional networks (Himmelman, 2001; Luque et al., 2010). However, it may also reflect that the activities of the PDFP were more conducive to less intensive types of professional interaction than collaboration. Further research is needed to relate these results to program success and to identify specific mechanisms related to collaboration.

Findings from the PDFP network analysis suggest that the AGE*SW*-related networks may differ by cohort, suggesting a need for more research on cohort-level factors associated with participants' network development. It may be that the specific workshops and opportunities offered in each year differed as the PDFP implemented lessons learned after the launch of the program. Furthermore, there may have been a surge of energy among established scholars to support the first PDFP cohorts which subsided in subsequent years. Further research, including social network analysis of later PDFP cohorts, could help to identify mechanisms that support the development of professional ties for cohort members.

Limitations of the PDFP Network Analysis

In spite of the insights potentially gleaned from this study, it has some important limitations. The major limitation is related to missing data and low response rate. The small sample size limits conclusions that can be drawn from the findings. Without a participation rate of approximately 80% (Kossinets, 2006), we could not accurately describe the structure of the network as a whole (e.g., the existence of a core/periphery structure, cliques, or isolated alumni) and we chose not to perform sociometric analyses which would have yielded biased results due to the missing data. Although our egocentric results show potential cohort differences in network size, the small numbers of study participants precludes making definitive conclusions. To recruit

participants, we sent two emails inviting PDFP alumni to participate in the social network study after many of the alumni had already participated in the prior study (Kusmaul et al., 2019). This decision was in part based on the logistics of administering different surveys to members of the first three cohorts and on a concern that combining the 38-item survey with the social network survey would create respondent fatigue. However, this may have confused alumni who had already completed the first survey and thought the new invitation was redundant.

Additional limitations arise from the study design itself. The survey solicited retrospective evaluations which may have led to recall bias. We set membership in the earliest cohorts (i.e., 2010 - 2012) as an inclusion criterion to assess the networks of alumni who were further along in their career development than those from later cohorts. However, this choice meant respondents were asked to report on professional ties over the course of several years.

Finally, it is noteworthy that the study design did not account for the various places in which PDFP alumni may have made the acquaintance of the aging-related scholars. Some of the potential venues for making social connections through AGE*SW* could have been public events such as AGE*SW* receptions at conferences. In this case, PDFP alumni could have met other scholars without having been a PDFP fellow. Using a comparison group of other aging-related scholars who did not participate in the PDFP would have helped overcome this limitation.

Recommendations

This study suggests that social network analysis can be an important aspect of evaluation of programs designed to support collaboration, cooperation, and communication among individuals or organizations. Social network analyses of pre-dissertation training programs can be important for identifying their effects on participants' professional networks and for providing insights into what works and what is less successful in helping doctoral students build strong

professional networks. Program leaders and evaluators could include collection of network data as part of their routine program evaluation efforts by adding network assessment items to the surveys they administer to participants.

The ability to be compare individual's personal networks based on the characteristics of their network members is one of the strengths of social network analysis. For example, the PDFP social network analysis could have collected data on the characteristics of the scholars with whom the PDFP alumni were connected. Then, in addition to measuring the types and magnitude of the alumni's professional networks, the level of experience, prestige, and influence from within the networks could be assessed. Potential characteristics could include their h-index, the Carnegie classification of their university, or ranking of their social work program.

To overcome potential problems with low response rate and recall bias, we suggest administering network surveys upon program completion or shortly thereafter. For example, in the PDFP, this might include asking fellows to complete a social network survey upon program completion to measure the presence and strength of ties to other cohort members, AGESW board members, program presenters, and any other scholars they met as a result of participation in the program. Capturing this data at the point of program completion would assist in isolating the effects of the PDFP training on each cohort. It may also help to ensure high response rates, since the survey could be administered as part of other program components.

In addition to assessing the immediate impact of training programs on professional networks, it is valuable to understand their long-term effects. To accomplish this, retrospective studies may be necessary. One way to reduce recall bias in this case is to conduct multiple-wave longitudinal research. This approach allows for sophisticated analyses to track changes in the networks over time, but requires more resources to implement. Because program participants

would no longer be closely connected to the program's activities, strategies would need to be used to maximize survey response. These could include using a three-step recruitment strategy that might include use of one postcard mailer in addition to two email outreach attempts (Phillips, Reddy, & Durning, 2016). Additionally, provision of a small financial incentive, such as a gift card or discount on organizational membership or conference registration, might help to incentivize participation (Kost & Correa da Rosa, 2018). Finally, survey distribution could be timed to overlap with a major annual conference so that outreach could be conducted both via email and in-person at networking events.

Conclusion

Because of the importance of professional networks in fostering academic success, especially among junior faculty, more research is needed to understand how pre-dissertation training programs such as the PDFP may help participants to learn effective networking strategies and to begin to develop their own professional networks. As our study demonstrates, social network analysis has potential as an analytic strategy for evaluating the effectiveness of pre-dissertation training programs. Although our analysis was limited by low response rates, the findings suggest that the PDFP holds potential for fostering professional development among gerontological social work doctoral students. More research is needed to assess whether PDFP-type programs are more effective than doctoral training alone at helping emerging scholars to develop professional networks. Further, exploration of whether there are other characteristics (e.g., advisor's reputation) that may mediate the relationship between participation in training programs and development of strong professional networks. Social network analysis is an effective method for examining these types of research questions and offers potential to help

address gaps in knowledge about how best to train doctoral students for successful academic careers, especially in high-need fields such as gerontological social work.

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Figure 1. Questionnaire matrix assessing relationship ties between AGESW Pre-Dissertation Initiative Alumni and individuals they met through AGESW-related activities.

	I would be able to contact this person for a question (e.g., about a research study or a class they are teaching)	I would feel comfortable introducing this person to another colleague	COMMUNICATION – I have communicated with this person since meeting through AGESW	CONFERENCE PRESENTATION COLLABORATION – I have collaborated with or am currently planning a collaboration on a conference presentation	MANUSCRIPT COLLABORATION – I have collaborated with or am currently planning a collaboration on a manuscript	None	Choose not to answer
Name 1	□	□	□	□	□	□	□
Name 2	□	□	□	□	□	□	□
Etc.	□	□	□	□	□	□	□

Note: The names in this questionnaire matrix were populated from names selected from a roster and provided on an open ended question through a name generator question in previous questions on the survey.

Figure 2. Total number of professional relationship ties among AGESW Pre-Dissertation Alumni from 2010-2012 cohorts ($N = 12$).

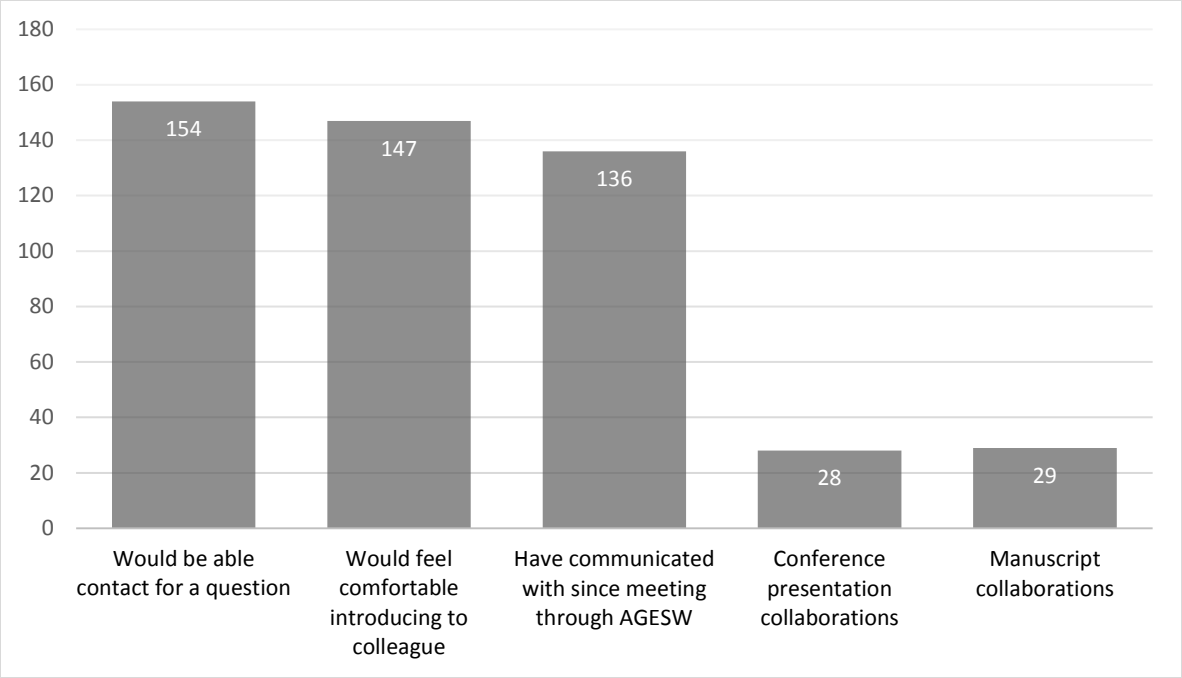
180
160
140
120
100
80
60
40
20
0
154
147
136
28
29
Would be able contact for a question
Would feel comfortable introducing to colleague
Have communicated with since meeting through AGESW
Conference presentation collaborations
Manuscript collaborations

Table 1. Size of professional networks met through AGESW of participants in AGESW Pre-Dissertation Initiative 2010-2012 cohorts ($N = 12$) by cohort.

	2010 Cohort $n = 4$		2011 Cohort $n = 5$		2012 Cohort $n = 3$	
	M	*SD*	*M*	*SD*	*M*	*SD*
Individuals met through AGESW	32.3	11.8	16.8	10.2	8.7	4.5
Type of professional relationship tie						
Would be able to contact	21.3	11.0	10.0	9.8	1.0	1.7
Comfortable introducing to colleague	20.3	14.4	10.0	10.3	0.0	0.0
Communicated with	21.3	9.4	8.4	9.3	0.0	0.0
Conference presentation collaboration	4.0	3.4	2.0	3.4	0.0	0.0
Manuscript collaboration	4.3	2.5	2.2	3.8	0.0	0.0