

Doris Duke Fellowships for the Promotion of Child Well-Being: Network Analysis 2016-2017

July 2018

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Executive Summary

Established in 2010, the Doris Duke Fellowships for the Promotion of Child Well-Being focus on identifying and nurturing 15 promising doctoral students each year from multiple disciplines. The program engages fellows for two years to collectively address emerging challenges in improving child well-being by applying research-based solutions to policy and practice challenges. The fellowship's ongoing implementation is guided by three core operational objectives:

- **Selecting individuals** with the skills, passion, and institutional support necessary to sustain long-term professional involvement in the field.
- **Selecting cohorts** of fellows that collectively represent a diverse group of scholars in terms of their backgrounds, disciplines, research interests, and technical expertise.
- **Creating an active, self-generating learning network** among the fellows through ongoing web-based conferences, annual meetings, opportunities for informal meetings at relevant national conferences, and shared research projects.

For the past four years, we surveyed current and graduated fellows regarding the strength of the learning network both within and across cohorts. This report summarizes the results of our most recent survey of the fellowship's initial six cohorts. Of these 90 individuals, 30 were still enrolled during the data collection period (July 2016–June 2017) and 60 had graduated the fellowship before June 2017.

Key Findings

While there are distinct differences in the shape and density of the networks across cohorts, the data suggested that fellows developed strong relationships with their colleagues and that these relationships cross academic disciplines and research topics. Specifically, key trends observed in our current study included:

- The fellowship successfully established a strong and connected network of early career researchers. Twenty-three percent of all possible connections between the 90 current or graduated fellows participating in the survey occurred during the reporting period. Although not all fellows were connected at a high level, the majority of fellows – from the first cohort to the most recent – frequently engaged with fellows from multiple cohorts.
- There was a consistent core group of fellows who remained highly engaged since enrolling in the fellowship and were engaged in multiple projects with fellows within and across cohorts. This group of roughly a dozen fellows were viewed by their peers as

leaders in the fellowship network and in their field of study. These fellows engaged with a large number of fellows, kept some fellows who were less engaged in the network, and initiated and encouraged collaboration among fellows across cohorts.

- Over time, the number of cross-cohort interactions increased due in part to the opportunities the fellowship provided to link current and graduated fellows. These opportunities included mid-year meetings with fellows from all cohorts, a peer mentoring program, and intentional introductions by fellowship staff to connect fellows sharing common interests.
- The engagement rates of individual fellows within the network fluctuated over time. Changes in the professional and personal lives of fellows impacted the bandwidth they had to maintain connections with peers outside their institutions and organizations. This was part of the natural flow of the network. An individual's ultimate measure of network involvement as well as the strength of interactions within a given cohort is best judged over time.
- Fellows connected with other fellows for a variety of reasons. While common disciplines remained a strong force behind the initial relationships fellows establish, over time fellows connected with their colleagues from other disciplines, driven by such factors as the social problems being examined, the populations of interest, and the research methods being applied.

Methodology

Social analysis research techniques were used to map and measure the interactions between fellows and the relative strengths of these relationships. Data were generated through a web-based survey and sent via Survey Monkey to all 90 fellows in Cohorts One through Six. Fellows were asked to report the number of interactions they had with other fellows, both within and outside their cohort, between July 2016 and June 2017 in two different categories:

- in-person contact; and
- virtual contact (e.g., email, phone call, conference calls, Skype).

For each of these, fellows indicated the frequency of interactions on a 6-point scale: 0 = No contact; 1 = single contact; 2 = 2–5 times a year; 3 = 6–11 times a year; 4 = 12–23 times a year; and 5 = 24 or more times a year. For those fellows with whom a respondent documented a contact, respondents rated the quality of the contact on a 5-point scale from 1 (i.e., a weak, short connection) to 5 (i.e., a strong, lengthy connection). In developing the graphs, we utilized a number of techniques to make the data and their implications more accessible to the reader. The variation in both the width and darkness of the lines between two given fellows reflects variation in the frequency and reported quality of these interactions. The *width* of each line indicates the total number of in-person or virtual interactions between two fellows; the broader

the line, the greater the number of interactions. The *darkness* of each line indicates the average reported quality of all of the in-person or virtual interactions between two fellows; the darker the line, the higher the reported quality.

In recording their contact with other fellows, respondents from Cohorts Five and Six were asked **not** to include interactions that occurred during the two required fellowship meetings each year as well as connections made discussing their small group project work. As such, the level of contact reported in this document for these two cohorts reflects the minimal level of contact outside of mandatory fellowship interactions among current fellows during 2016-2017.

In this report, we use social network analysis to illustrate the extent to which fellows within a given cohort were in communication with others in their cohort and examine what factors—such as academic discipline or membership in the same small group (as a proxy for early shared research interests)—led to greater, more frequent interactions. We also examine how frequently relationships developed across the six cohorts examined and if specific fellows played a greater or more limited role in generating these cross-cohort bridges. To visually illustrate these interactions, we developed networking graphs for each individual cohort as well as for the full sample. Graphs were created using NodeXL Pro, an open source network analysis extension for Microsoft Excel.

For contact to be included in the analysis, only one fellow was required to report the interaction. Connections were defined simply: Fellow A reported at least one interaction with Fellow B and this was counted as a single connection regardless of the number of times they interacted and the mode in which they interacted (virtually **or** in-person). However, if Fellow A connected with Fellow B both virtually **and** in-person during the reporting period, these interactions would tally as two connections in the calculation of this count.

Summary of Interactions with each Cohort

Cohort One

- During 2016–17, 93% of Cohort One fellows were in contact with each other. Ten fellows (67%) were in contact with at least half of the other fellows in their cohort, which was the same percentage the group recorded in 2015-16.
- Nearly half of the Cohort One fellows reported interacting with more of their Cohort One peers this year compared to last. This suggests that the strength of the network is not fading with time, but rather getting stronger and fellows are connecting with new and/or more fellows within their cohort each year.
- Cohort One remains one of the most consistently connected cohorts. More than half of all of their connections were rated as high quality. As the first cohort in the fellowship, there may be a sense of unique pride and responsibility felt on behalf of this cohort to ensure the fellowship's success and endurance.

Cohort Two

- During 2016–17, 80% of Cohort Two fellows were in contact with each other, indicating three fellows did not have any engagements with another fellow from their cohort during this time. Only one fellow (7%) was in contact with at least half of the other fellows in their cohort; this rate of engagement is comparable to 2015-16.
- There were no Cohort Two fellows who reported interacting with more cohort peers this year as compared to the prior year. In fact, 10 fellows reported engaging with fewer peers.
- This cohort boasted the largest percentage of across-cohort connections, with nearly 70% of all connections taking place with fellows outside of their own cohort. While cohesion may not have been as strong in this cohort compared to others, they are still finding value in the fellowship network as a whole.

Cohort Three

- During 2016–17, 100% of Cohort Three fellows were in contact with each other. Among the Cohort Three fellows, 10 out of the 15 fellows (67%) connected with at least half of the other fellows in their cohort, which was twice the rate of engagement for this cohort than was reported in 2015-16.
- More than half (60%) of the Cohort Three fellows reported interacting with more of their Cohort Three peers this year compared to last.
- This improvement may reflect greater stability in their own work and professional position over time, allowing more time to maintain contact with their fellowship peers. Since last year, the small groups within this network became more pronounced as subgroups within the structure of the cohort network.

Cohort Four

- During 2016–17, 100% of Cohort Four fellows were in contact with each other. Among the Cohort Four fellows, seven of the 15 fellows (47%) connected with at least half of the other fellows in their cohort, which was a significant drop from 2015-16 when all Cohort Four fellows connected with at least half of the other fellows in their cohort.
- For this cohort, small group affiliation played a more consistent role in shaping the network than in most other cohorts.
- While Cohort Four connections dropped this year, this decline was comparable to the pattern we observed last year among Cohort Three fellows, suggesting this drop might be temporary. The first post-fellowship year is challenging for most fellows, often

involving re-location, adjustment to a new job, and establishing new professional relationships. We anticipate that participation among Cohort Four fellows will improve over the coming year as they become more settled in their new locations.

Cohort Five

- During 2016–17, 100% of Cohort Five fellows were in contact with each other. Among the Cohort Five fellows, 10 of the 15 fellows (67%) connected with at least half of the other fellows in their network. This was a large increase from 2015-16, when the cohort was in their first fellowship year and only four fellows connected with at least half of their cohort. Cohort Five had one of the highest engagement rates among the cohorts included in the survey.
- All but three Cohort Five fellows connected with more fellows in their cohort during 2016-17 compared to the number of fellows they connected with the year prior. Of the remaining three fellows, two maintained contact with the same number of cohort peers this year as compared to last year.
- It is important to keep in mind that the reported number of connections does not include any encounters that occurred during fellowship events. Nearly two-thirds of the interactions for Cohort Five reported were virtual, suggesting that these fellows are very comfortable maintaining contact with their peers outside fellowship functions.

Cohort Six

- During 2016–17, 100% of Cohort Six fellows were in contact with each other. Among the Cohort Six fellows, eight of the 15 fellows (53%) connected with at least half of the other fellows in their network, which fell in the middle of the engagement rates reported for all cohorts. While fellows were not connecting with a large number of their peers outside fellowship events, many of those relationships that were being established occurred with high frequency.
- Every fellow in Cohort Six connected with at least four other fellows. This number was among the highest reported across all of the cohorts studied.
- Cohort Six appears to already be engaged in the network as a whole, with nearly two-thirds (65%) of their engagements taking place with fellows in other cohorts. This was the second highest rate of across-cohort interactions reported among the six cohorts studied.

Summary of Full Fellowship Network

Overall Interactions

- Fellows reported a total 1,848 connections across the full fellowship network, and 23% of all possible connections between all current or graduated fellows in the fellowship network occurred during the reporting period. This percentage of overall network interactions was the same as last year, even though this network included 15 additional fellows.
- Overall, the range for the number of connections reported by each fellow was 0 to 73 and the mean was 20.5. Exactly one-half of the 1,848 connections (924) were recorded as in-person connections and the other half were virtual (e.g., email, phone). Many of these 1,848 connections (1,356, 73.4%) were also reciprocated connections – if Fellow A noted they connected with Fellow B *and* Fellow B noted they connected with Fellow A, this is defined as a reciprocated relationship and is tallied twice in this count.¹
- Four of the six cohorts reported similar total number of connections – Cohorts Two, Four, Five and Six reported connections ranging from 259 to 267. A considerably greater number of connections were reported by fellows in Cohort One (382) and Cohort Three (414).
- Among the full fellowship network, a total of 613 reported connections (33%) were within-cohort engagements, and 1235 (67%) were connections made between fellows in different cohorts. This relatively high proportion of across-cohort interactions may in part reflect the high number of graduate fellows attending the Fellowship Mid-Year meeting at Rutgers in 2017. Increased across-cohort communication may also reflect more intentional planning by fellowship staff to connect fellows from different cohorts through such efforts as the peer-to-peer mentoring program and various joint learning opportunities.

Quality

- Fellows gave a quality rating for 1,779 (96%) of all 1,848 connections. Of these rated connections, 804 (45%) were rated as high quality (a “4” or “5” on five point Likert scale), 405 (23%) were rated “3”, and 570 (32%) were rated a “1” or “2.”

¹ To estimate the number of unduplicated fellow connections, we can take the number of non-reciprocated connections (492) plus half of the reciprocated connections (1356/2=678) and get 1,170 estimated unduplicated fellow connections during the reporting period.

Introduction

The complexity of resolving many of the threats to healthy child development and well-being requires a core body of individuals interested both in understanding the problem and in working across disciplines to develop new knowledge. In commenting on this shift toward cross-disciplinary learning, a recent report by the Carnegie Foundation for the Advancement of Teaching (CFAT) observed that the most productive areas for advancing our understanding of diverse social problems may lie in the “border land between disciplines.” The report goes on to note that maximizing the ability of young scholars to explore this territory will require a new approach to doctoral education, one which focuses on “building intellectual communities that have an intentional focus on diverse membership and multiple strategies for identifying new learning” (Walker, 2007, p.3).

The Doris Duke Fellowships for the Promotion of Child Well-Being reflect much of this new thinking regarding doctoral education and training in its design and implementation plan. From the onset, the fellowship recognized the challenges facing the child abuse prevention field and the importance of remaining open to innovation and new frameworks for conceptualizing the issue and crafting an effective response. Established in 2010, the fellowships focus on identifying and nurturing 15 promising doctoral students each year from multiple disciplines. The program is structured to engage fellows for two years to collectively address emerging challenges in the field. The fellowship’s ongoing implementation is guided by three core operational objectives:

- ❖ **Selecting individuals** with the skills, passion, and institutional support necessary for sustaining long-term professional involvement in the field.
- ❖ **Selecting cohorts** of fellows that collectively represent a diverse group of scholars in terms of their backgrounds, disciplines, research interests, and technical expertise.
- ❖ **Creating an active, self-generating learning network** among the fellows through ongoing web-based conferences, annual meetings and other opportunities for informal meetings at related national conferences, and shared research projects.

For the past four years, we have surveyed current and graduated fellows regarding the connections they have had with other fellows both within and outside their cohort. This document reports on the results of our most recent survey of the fellowship’s initial six cohorts. Of these 90 individuals, 30 were still enrolled for the data collection period (July 2016-June 2017) and 60 had graduated the fellowship before June 2017. All 90 fellows responded to this survey, for a 100% response rate (up from 93% the previous year). This sustained sample and survey allows us to assess the frequency and quality of interactions fellows enjoy with their colleagues while in the program, but also to assess the extent to which these relationships are sustained over time. Because we have replicated the survey process and methodology we used

in past years, we are able to report changes in the strength and quality of the networks for Cohorts One through Five.

Social network analysis was used to map and measure the interactions among fellows and the relative strengths of these interactions. While there were distinct differences in the shape and density of the networks across cohorts, the data suggested that fellows develop strong relationships with their colleagues, and especially their small group peers, while in the program. These relationships continue over time. Most importantly, from the perspective of the fellowship, these relationships cross disciplinary boundaries, with fellows from diverse disciplines forming strong connections. This may be particularly true as fellows seek collaborators in refining and advancing methodological issues such as implementation research, measurement, and risk reduction.

Method

According to the International Network for Social Network Analysis (SNA), network analysis is “based on the intuitive notion that these patterns are important features of the lives of the individuals who display them. Network analysts believe that how an individual lives depends in large part on how that individual is tied into the larger web of social connections.” SNA has found applications for the method in “organizational behavior, inter-organizational relations, the spread of contagious diseases, mental health, social support, the diffusion of information and animal social organization” (Freeman, 2016).

Social network analysis allows social groups to be analyzed mathematically and shows the connection points and the shape of social networks. In this report, we use social network analysis to illustrate the extent to which fellows within a given cohort were in communication with others in their cohort and examine what factors—such as academic discipline or membership in the same small group (as a proxy for early shared research interests)—lead to greater, more frequent interactions. We also examined how frequently relationships develop across the six cohorts examined in this analysis and if certain fellows play a greater or more limited role in generating these cross-cohort bridges. To visually illustrate these interactions, we developed networking graphs for each individual cohort as well as for the full sample. Graphs were created using NodeXL Pro, an open source network analysis extension for Microsoft Excel.

Data Collection

Data were generated through a web-based survey and sent via Survey Monkey to all 90 fellows enrolled in Cohorts One through Six. Fellows were asked to report the number of interactions they had with other fellows, both within and outside their cohort, between July 2016 and June 2017 in two different categories:

- in-person contact; and
- virtual contact (e.g., email, phone call, conference calls, Skype).

For each of these interactions, fellows were asked to indicate the frequency of events on a 6-point scale: 0 = No contact; 1 = Single contact; 2 = 2–5 contacts a year; 3 = 6–11 contacts a year; 4 = 12–23 contacts a year; and 5 = 24 or more contacts a year. For those fellows with whom a respondent documented a contact, respondents were asked to rate the quality of the contact with the fellow on a 5-point scale from 1 (i.e., a weak, short connection) to 5 (i.e., a strong, lengthy connection).

In recording their contact with other fellows, respondents from Cohorts Five and Six were asked **not** to include interactions that occurred during the two required fellowship meetings each year and not to include connections made discussing their small group project work. As such, the level of contact reported in this document for these two cohorts reflects the minimal level of contact outside of mandatory fellowship interactions among current fellows during 2016-2017.

For contact to be included in the analysis, only one fellow is required to report the interaction. Should both fellows report an interaction, the highest frequency and highest quality reported between the pair will be encoded on the graph. Similarly, a fellow's degree of connection and measures of centrality are not affected by reciprocated connections versus connections reported by only one fellow.

Key for Networking Graphs

In developing the graphs, we utilized a number of techniques to make the data and their implications more accessible to the reader. The variation in both the width and darkness of the lines between two given fellows reflects variation in the frequency and reported quality of these interactions. The *width* of each line indicates the total number of in-person or virtual interactions between two fellows; the broader the line, the greater the number of interactions. The *darkness* of each line indicates the average reported quality of all of the in-person or virtual interactions between two fellows; the darker the line, the higher the reported quality. Interactions of the highest quality were signified in a fully opaque line of a darker color. The variation in the color and type of lines reflects the variation in the type of interaction reported. *Solid, steel blue* lines represent in-person interactions. *Dashed, grey* lines represent virtual interactions. Virtual and in-person interactions frequently overlap, indicating that two fellows reported both types of interactions.

Social Network Analysis Terminology

Throughout this report, we have used terminology commonly employed in reporting network analysis. These terms and related definitions are noted below.

- **Edges** are the connections between individuals (i.e., vertices) within a social network. In our network, edges code in-person (i.e., solid, steel blue lines) or virtual (i.e., dashed, grey lines) interactions between fellows.
- **Vertices** are the individuals (sometimes referred to as nodes) that make up a social network. In our network, the vertices are the fellows.
- **Degree** denotes the number of direct connections of each vertex (i.e., fellow) in the network; in our report, it is the number of other fellows an individual has connected with during the year. Fellows with the highest degree are communicating with the greatest number of other fellows in the network. In our graph, each line is considered a "connection" with its width indicating the "frequency" of these contacts and its opacity indicating the average "quality" across all of the individual contacts that make up that specific connection.

- **Retention rate** is a measure of the vertices (i.e., fellows) within a cohort that have connected with at least half of their cohort peers during the survey period. Because each fellow has 14 peers in their cohort, a fellow is considered retained in their cohort network if their number of degrees is seven or higher—meaning they connected with seven or more other fellows in their cohort. The rate is calculated by dividing the total number of fellows in a network (15 for each cohort) by the number retained in that network and converting to a percentage.
- **Graph density** is the ratio between the number of edges (i.e., connections between fellows) in the graph and the total number of possible edges available in the network (if each fellow interacted with all of the other fellows in network). Thus, the higher the graph density, the higher the percentage of possible connections captured within the graph.
- **Betweenness centrality** indicates the power of a vertex (i.e., fellow) to broker connections between other fellows within the network. Thus, fellows with a high betweenness centrality are essential to the connectivity of the network, even if they do not have the highest degree. These fellows are most essential for connecting to fellows who are not accessing the network through other connections with fellows.

Organization of the Report

The report presents data for each individual cohort first, followed by analysis of the full fellowship network. For each cohort, we visually present the network, noting first the small group affiliations, or early shared research interests, of all the fellows and then noting each fellow's academic discipline. In addition, we present descriptive statistics noting each fellow's degree (i.e., number of fellows to whom they have a connections), betweenness centrality, small group affiliation, and academic discipline. Where appropriate, we compare the current network profiles to those generated in previous reports.

Findings

Cohort One

Cohort One was selected in 2011 and graduated from the fellowship in 2013. Within this cohort, one fellow did not have any interactions with any other fellow within the cohort during the year and has therefore dropped out of this network. Figure 1 shows the interactions among the remaining 14 Cohort One respondents, with the fellows' names color coded to reflect their small group assignment. For Cohort One, these small groups included child welfare practice and reforms, youth development and policies, and early intervention. Figure 2 presents the same data but highlights each fellow's specific discipline. As noted in Figure 2, 10 of the 14 active fellows were enrolled in either social work or a joint social work-psychology program, shown in red. Of the remaining four active fellows, three were in clinical or development psychology, shown in orange, and one was in public administration, shown in black.

Description of the Network

Cohort One has a graph density of 0.63, meaning that 63% of possible edges (i.e., connections) between Cohort One fellows have occurred during this reporting period. This was only slightly lower than last year, when the Cohort One network had a calculated graph density of 0.69. Of the 15 Cohort One fellows, 14 were still active with their cohort. The 14 active fellows exhibited both high degrees of connection and fairly robust connections. Four of the fellows (Fellow 103, Fellow 105, Fellow 108, and Fellow 112) reported contact with at least 10 of their peers within the Cohort One network.

The Cohort One network exhibited an average degree of 8.1, indicating that, on average, the 14 active Cohort One fellows interacted with a little over half of their cohort. Because this network was well connected, fellows with high degrees also exhibited higher betweenness centrality. In the less dense cohort networks, the role of vertices (i.e., fellows) with high measures of centrality will become evident, as these fellows played an important role as bridges from the periphery to the core of the network.

The fellows who form the center of the network were Fellow 103, Fellow 108, and Fellow 112. These three fellows had the highest degrees in the network. They, along with Fellow 107, Fellow 105, and Fellow 102, also had a high number of high-quality, frequent interactions, as indicated by the dark, wide lines connecting them in Figure 1. Fellow 103 also had a very high betweenness centrality number, as shown in Table 1. This indicates the essential role this fellow played in keeping fellows engaged who might not otherwise remain connected to their Cohort One peers. These patterns were consistent with those we observed within this cohort in the previous year.

Small Group Affiliation

The sustained and variable impacts of the initial small group placements within Cohort One are visible in Figure 1. Within the green group, Fellow 108 and Fellow 102 maintained their strong relationship, as evident by the wide and dark lines connecting them in Figure 1. However, they were not as connected to other members of their small group. Among the blue group there was a similar pattern, where Fellow 110, Fellow 103, and Fellow 105 formed a strong connection. Last year, Fellow 110 and Fellow 103 had this connection, and this year, Fellow 105 became more connected to these two fellows. Both of these groups also had a strong graph density—the former with density of 0.80 (i.e., 80% of possible connections in this group occurred), and the latter with a density of 0.90.

The fellow who dropped from the network was a member of the group represented in red. In addition, most other members of this group (i.e., Fellow 101, Fellow 113, and Fellow 104) had only weak ties with one another and with the Cohort One network as a whole; their group graph density is 0.33. Losing one fellow from the network and the relative weakness of ties among the remaining members of this group suggests that members in this small group did not establish the same strength of relationships that we observed among participants in the other two groups.

Disciplines

The effect of discipline on the Cohort One network is difficult to discern due to the significant majority of social work students, shown in red, within this cohort. However, acknowledging that this network has a dominant social work focus, we still see some strong connections among the other two disciplines in this cohort—Public Administration, shown in black, and Psychology, shown in orange (see Figure 2). Indeed, the social work fellows are clustered in an obvious group with a graph density of 0.58; however, fellows with a psychology discipline had a higher graph density of 0.67. Additionally, the relative strength of connections between Fellow 105, a fellow in Public Administration, and her Cohort One peers in all disciplines illustrates that interdisciplinary connections have been maintained over time even in a cohort with one dominant discipline.

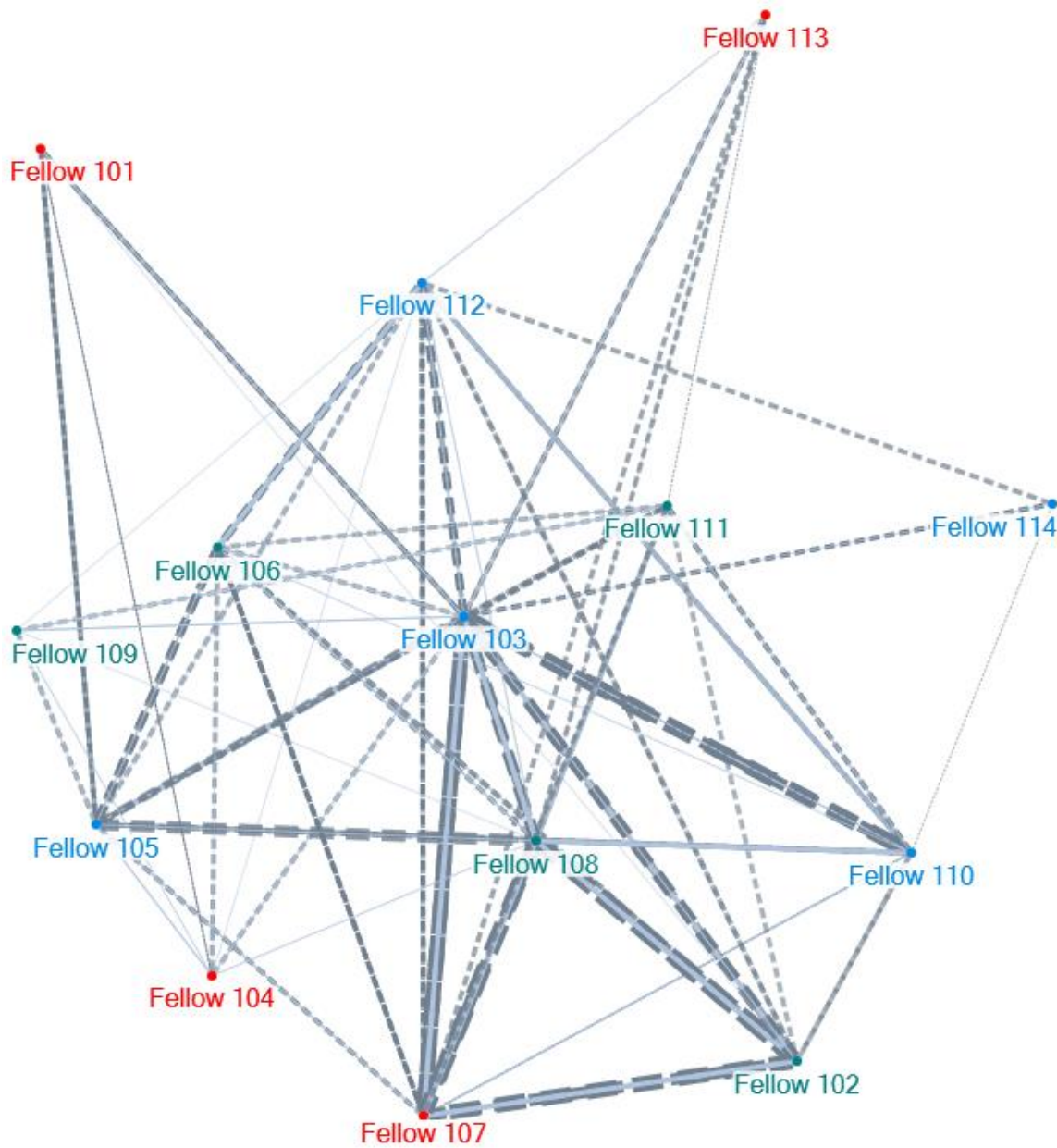
Retention

Analyzing a peer network helps to illuminate how a cohort is maintained. All but one of the Cohort One fellows were still in contact with at least one other fellow in this cohort. Most impressively, a Cohort One fellow who last year had dropped from the network reentered and connected with a few of her Cohort One peers this year. There were only five fellows with fewer than seven degrees (seven being half of the possible number of fellows to interact with and how retention is calculated). In the figures below, these individuals existed on the periphery of the network and may be in danger of losing contact with the group. This placed the cohort's retention rate at 67% (10 out of 15 have a degree of seven or higher). This was the same retention rate as last year. However, the cohort network was strengthened by an average of one

degree and only five Cohort One Fellows reported interacting with fewer peers this year compared to last while nearly half interacted with more of their Cohort One peers, as shown in Table 1.² This suggests that the strength of the network is not fading with time, but rather getting stronger and fellows are connecting with new or more fellows (or both) within their cohort each year.

² Table 1 includes all 15 fellows from Cohort One, including the one that dropped from the network this year.

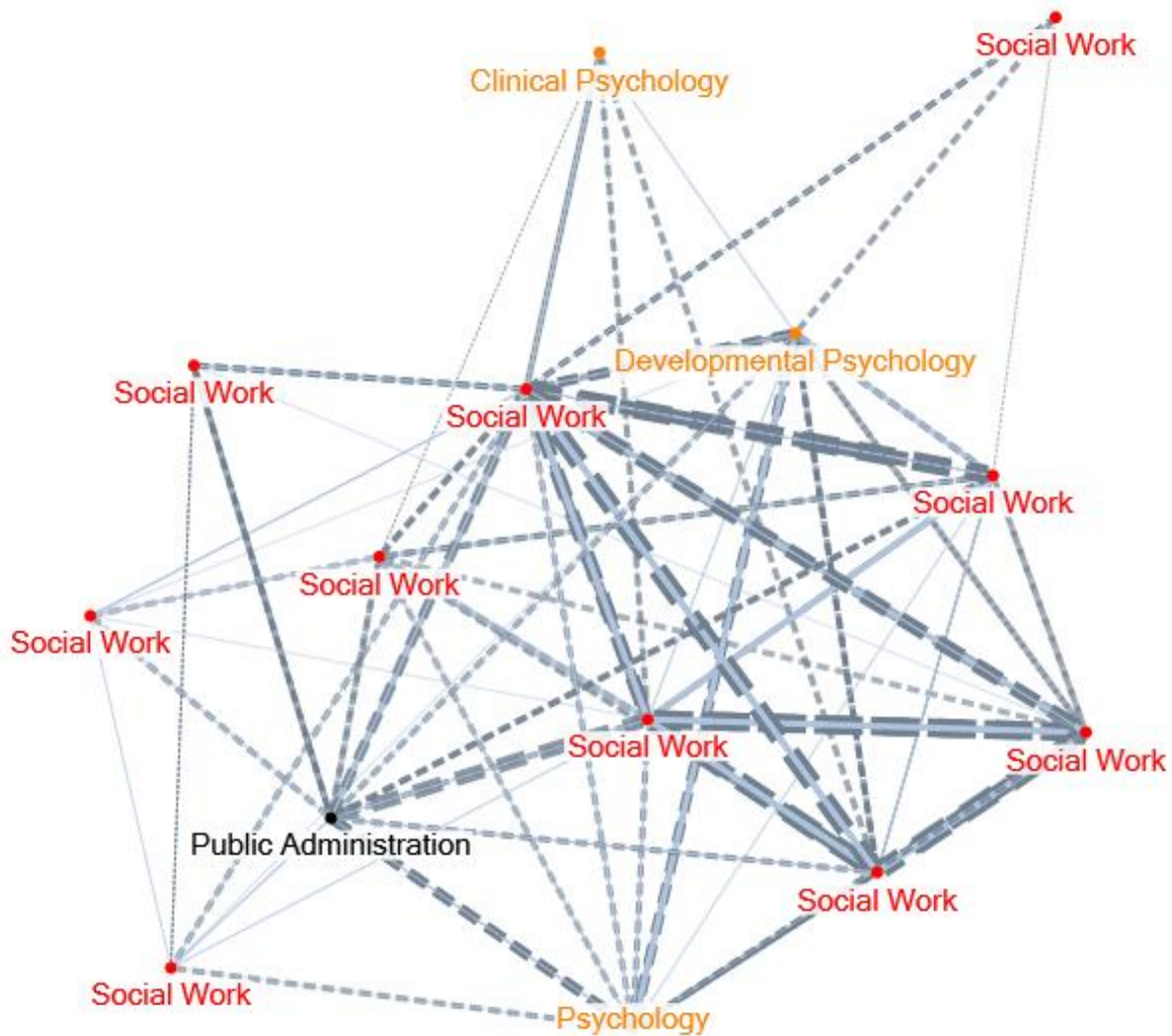
Figure 1. Cohort One Network: Small Group Affiliation



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.
4. Small group assignment is indicated by color.
5. One Cohort One fellow had no reported interactions with any other Cohort One fellow and is not represented in this graph.

Figure 2. Cohort One Network: Academic Discipline



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.

Table 1. Cohort One Descriptive Statistics

Cohort One Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 103	13	1	10.99	Social Work
Fellow 111	11	5	6.09	Psychology
Fellow 107	11	0	3.24	Social Work
Fellow 104	10	3	3.36	Public Administration
Fellow 109	9	1	2.4	Social Work
Fellow 110	9	-1	1.99	Psychology
Fellow 105	9	2	1.04	Psychology
Fellow 106	9	0	1.04	Social Work
Fellow 102	8	-4	1.86	Social Work
Fellow 114	7	1	1.25	Social Work
Fellow 108	6	-1	0.31	Social Work
Fellow 112	5	-2	0.11	Social Work
Fellow 101	4	4	0.33	Social Work
Fellow 113	3	-3	0.00	Social Work
Fellow 115	0	0	0.00	Social Work
		Prior Year		
Network Average	8.1	7.2	2.43	
Network Median	9	7	1.55	

Notes:

1. Higher numbers are more advantageous.
2. *Degree*: Number of connections attached to that fellow.
3. *Betweenness*: How important each node/fellow is in providing a “bridge” between different parts of the network.

Cohort Two

Cohort Two was selected in 2012 and graduated from the fellowship in 2014. Within this cohort, three members did not engage with any other Cohort Two fellow and therefore dropped from this network. Figure 3 documents the interactions among the remaining 12 Cohort Two fellows, with the fellows' names color coded to reflect their small group assignment. For Cohort Two, these small groups included enhancing parental capacity, child welfare system reform, and implementation/program evaluation. Figure 4 presents the same data but highlights each fellow's specific discipline. As noted in Figure 4, the majority of the fellows were enrolled in either social work or social work and another discipline, shown in red. Of the remaining fellows, three were in a psychology field, shown in orange; one was in sociology, shown in blue; and one was in public health, shown in green.³

Description of the Network

Cohort Two had a graph density of 0.36, meaning that 36% of possible edges (i.e., connections) between fellows occurred. This was a decrease of 2% from last year. These fellows have been out of the program for three years and have consistently demonstrated weaker connections than other cohorts. The lower density score among the Cohort Two fellows was consistent with the pattern we observed last year, where Cohort Two reported the lowest density (0.38) of the five cohorts we surveyed. Since last year's report, the number of fellows active within their own cohort network also dropped. Last year, only one fellow reported no interactions with their Cohort Two peers; this year, three Cohort Two fellows reported no interactions with others in their cohort (including one fellow for the second year in a row). These three have thus dropped from the network and this section of the cohort's network analysis.

Of the 12 active fellows engaged in the network, the average degree of connection for the active fellows in this peer network was four, indicating that, on average, a Cohort Two fellow interacted with less than one-third of their cohort⁴. Because this network was more loosely connected, certain fellows had a high betweenness centrality score even if they did not have a high degree of connection, as noted in Table 2. This can most obviously be seen in Fellow 211's position within the network. Because this fellow had connections to the core, middle, and periphery of the network—notably, as the only connection to Fellow 212—the fellow had a high betweenness centrality (11.08) despite only having three connections. The core of the network was very clearly Fellow 203. This fellow was the only fellow to interact with more than half of his/her cohort's peers (9) and had the highest betweenness centrality (28.42), reflecting the central role the fellow played in sustaining the network. Individuals such as Fellow 212 and Fellow 203 served as

³ The fellows that dropped from the network were in Social Work (2) and Medicine (1). These three fellows are not represented in Figures 3 and 4.

⁴ The average degree for all 15 fellows is 3. The 3 nonactive fellows bring down the average by one degree, meaning, on average, each fellow in the network is interacting with one less fellow overall when all 15 fellows are included.

bridges between central and peripheral members and therefore played an important role in the network's overall connectivity.

Other fellows who joined Fellow 203 at the center of the network were Fellow 209, Fellow 204, and Fellow 202. These fellows had contacts with the largest number of fellows in the Cohort Two network, but none of them interacted with more than nine of the Cohort Two fellows. These were the same fellows who made up the core of the Cohort Two network last year. Unlike the fellows who formed the core of Cohort One, who had contact with over two-thirds of the active members in their network, the central actors within Cohort Two were engaged with far fewer of their cohort colleagues.

Small Group Affiliation

The impacts of small group connections are visible in Figure 3. Among the green group, every group member maintained a connection with at least one other group member, and four of the members maintained contact with at least three other members of their group. The graph density for this small group (0.70) was the strongest in the cohort. Though not all of the connections in this group were robust, the connections between Fellow 203, Fellow 202, and Fellow 204 were strong and provided the network's core structure.

Within the blue group, all five members were also active in the cohort and connected to at least one other member of their small group. Fellow 207, Fellow 208, and Fellow 209 formed a strong relationship; however, they were not as connected to the other members of their group. The other group members (i.e., Fellow 211 and Fellow 212) remained on the periphery of their small group network and the Cohort Two network as a whole. In total, this group had a graph density of 0.50.

The group shown in red was home to the three fellows who dropped from the Cohort Two network this year. The two active group members reported no connections with each other in the past year, giving them a 0.0 graph density. The active fellows who were part of this small group were also some of the least connected in the cohort network as a whole, connecting with only a few other fellows in their cohort. This correlation between small group affiliation and both degree and centrality within the network was also apparent in Cohort One, as discussed in the previous section, and points to the important effect small group connectedness has on overall cohort performance.

Disciplines

The effect of disciplines on the Cohort Two network was very similar to the effects observed in Cohort One. In both cohorts, the majority of active fellows were in a social work discipline and, in both networks, social work fellows formed the core of the network. In Cohort Two, the social work (including joint social work) fellows, shown in red, were somewhat clustered in a group and had a strong graph density of 0.67. However, unlike Cohort One, the Cohort Two fellows in the psychology field did not have any interactions with one another last year, and therefore had a graph density of 0.0 for the second year in a row. It is difficult to ascertain the effect of discipline

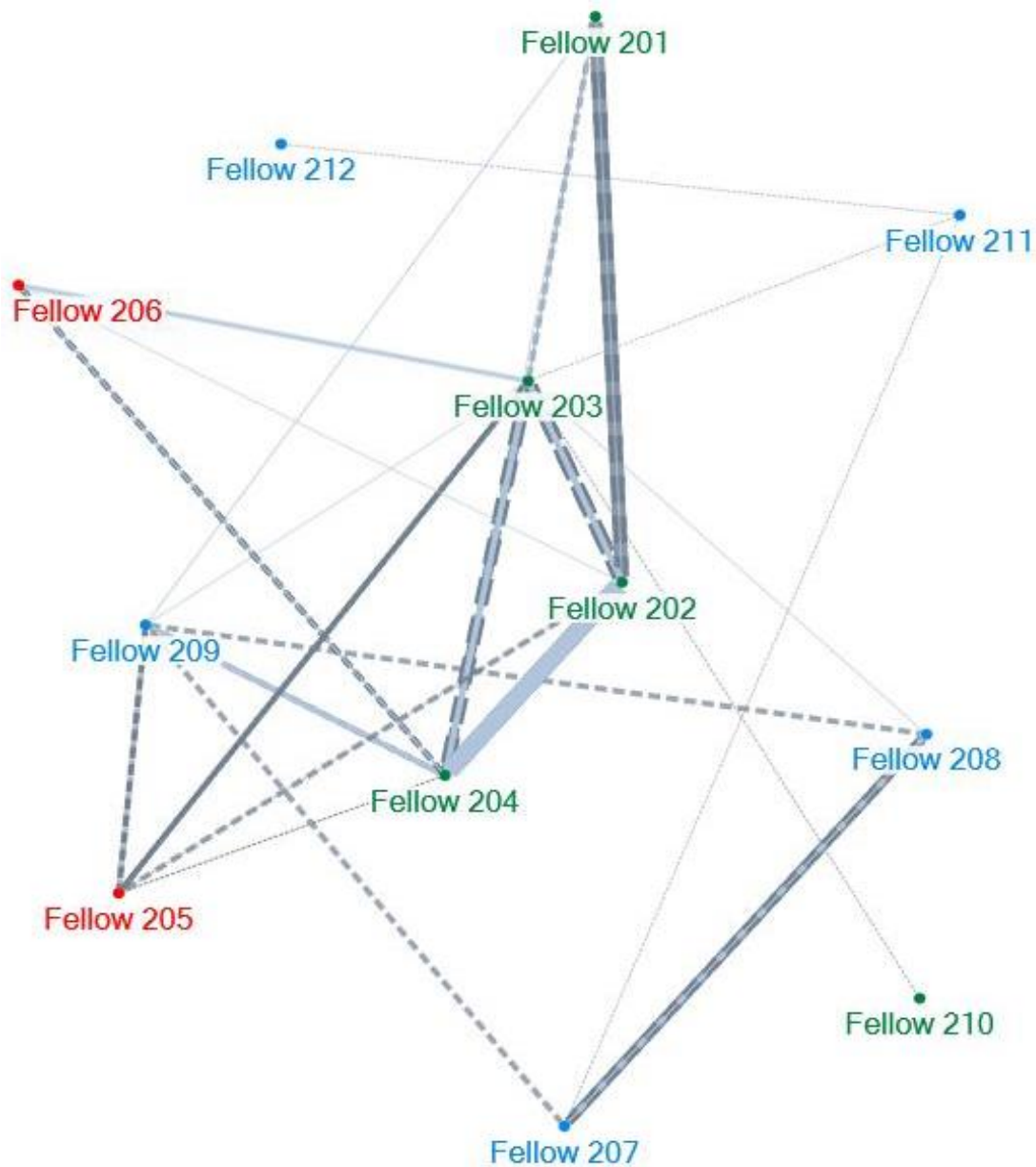
on the network because of the dominance of the social work discipline. However, these data suggest that discipline affiliation can affect the network's overall shape, as shown in Figure 4.

Retention

Over the past year, a total of three fellows from Cohort Two dropped from their cohort network, so that only 80% of the fellows were in contact with each other. Additionally, this cohort had fewer fellows maintaining a large number of connections within their peer group, with only one fellow connecting with over half of the cohort. This places the majority of the cohort on the periphery of the network and at risk of falling out of the group, as reflected in the extremely low retention rate of 7%. This is the lowest retention rate of all of the six cohorts included in this analysis. Perhaps most notable is that no fellow reported interacting with more of their cohort peers this year as compared to the prior year, with 10 fellows reporting interacting with fewer cohort peers (and the remaining five interacting with the same number of cohort peers), as shown in Table 2.⁵ This was consistent with last year's finding that the cohesion of Cohort Two decreases with each year, which was also illustrated in the consistent decrease in graph density, from 0.40 in 2014–15 to 0.38 in 2015–16 and now 0.36 in 2016–17.

⁵ Table 2 includes all 15 fellows from Cohort Two, including the three that dropped from the network this year.
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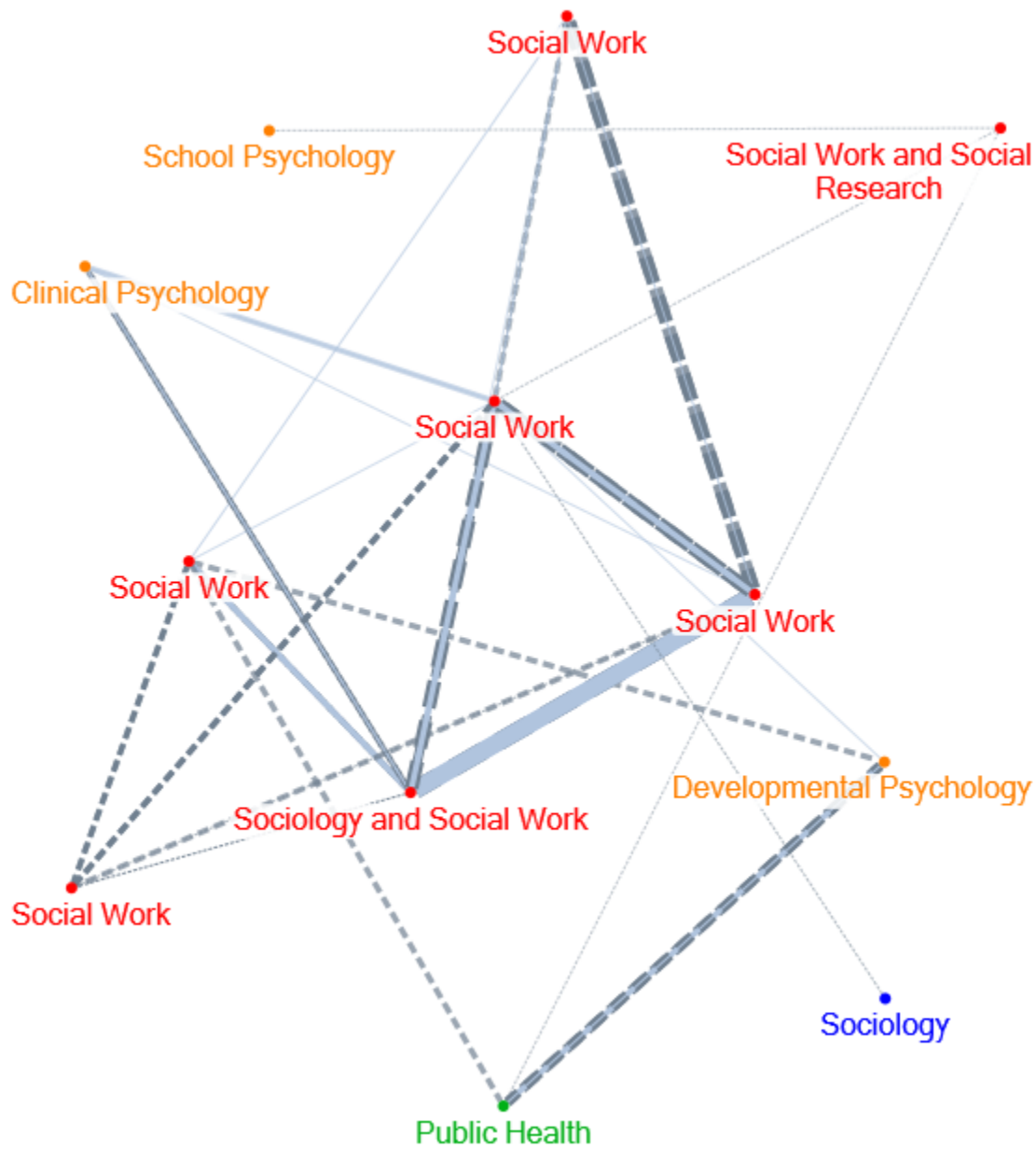
Figure 3. Cohort Two Network: Small Group Affiliation



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.
4. Small group assignment is indicated by color.
5. Three Cohort Three fellows had no reported interactions with any other Cohort Three fellow and are not represented in this graph.

Figure 4. Cohort Two Network: Academic Discipline



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.

Table 2. Cohort Two Descriptive Statistics

Cohort Two Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 203	9	0	28.42	Social Work
Fellow 209	6	-3	6.58	Social Work
Fellow 204	6	-1	2.08	Sociology and Social Work
Fellow 202	5	-4	0.92	Social Work
Fellow 201	4	0	0.42	Social Work
Fellow 205	4	0	0.42	Social Work
Fellow 211	3	-3	11.08	Social Work and Social Research
Fellow 207	3	-1	2	Public Health
Fellow 208	3	-3	1.08	Developmental Psychology
Fellow 206	3	-1	0.00	Clinical Psychology
Fellow 210	1	-2	0.00	Sociology
Fellow 212	1	0	0.00	School Psychology
Fellow 213	0	0	0.00	Social Work
Fellow 214	0	-2	0.00	Medicine
Fellow 215	0	-2	0.00	Social Work
		Prior Year		
Network Average	4	5	4.42	
Network Median	3.5	6	1.00	

Notes:

1. Higher numbers are more advantageous.
2. *Degree*: Number of connections attached to that fellow.
3. *Betweenness*: How important each node/fellow is in providing a "bridge" between different parts of the network.

Cohort Three

Cohort Three was selected in 2013 and graduated from the fellowship in 2015. Figure 5 documents the interactions among the 15 Cohort Three fellows, with the fellows' names color coded to reflect their small group assignment and initial research interests. For this cohort, the fellows participated in small groups focusing on early childhood, parenting capacity within the context of trauma-informed care, and the development and testing of new measures and risk assessment strategies.

Figure 6 presents the same data with respect to interactions among the fellows but highlights each fellow's specific discipline. As noted in Figure 6, six of the 15 fellows were enrolled in a social work program, shown in red. Of the remaining nine fellows, four were in child or human development, shown in purple; two were in psychology, shown in orange; one was in nursing, shown in green; one was in medicine, also shown in green; and one was in social policy, shown in black.

Description of the Network

Cohort Three had a graph density of 0.54, meaning that 54% of possible edges (i.e., connections) between fellows occurred. This was an increase in density over last year, when the cohort reported a graph density of 0.45. The Cohort Three network was largely influenced by small group affiliations rather than by discipline, as two of the small groups were still very strongly connected. As reported in Table 3, Cohort Three had an average degree of 7.6, meaning that, on average, a fellow in Cohort Three interacted with roughly half of their cohort peers during the reporting period. This led to a more central network overall, and a median betweenness centrality that was higher than Cohorts One and Two.

There was a clear network core, with six fellows reporting high-quality, high-frequency interactions with one another and others in the cohort. The lines connecting these fellows are wider, indicating a high number of interactions, and are both dashed and solid, indicating that they communicated virtually and see each other in-person throughout the year. The network became much stronger than in the previous year, with a much higher number of connections and retention in the network.

Small Group Affiliation

In this cohort network, small group affiliations played a large role in the network's structure. Both the red and blue small groups had a graph density of 1.0, meaning that every member of the group was connected to each other member, as seen in Figure 5. The members of the red group showed more interactions with each other on the whole (indicated by wider lines), however they appear of lesser quality (indicated by lighter lines) compared to the members of the blue group.

The green small group had a graph density of 0.60. These five members also formed the network's periphery. Two of the members of this small group, Fellow 309 and Fellow 314, connected with more than half of their cohort and had the two highest betweenness centrality scores out of the entire network. The high centrality score is a reflection of their connections with their other small group members, who were otherwise limited in their connections and engagement with their cohort peers. Connecting with Fellow 309 and Fellow 314 were the principal means through which the other three remain engaged in this network.

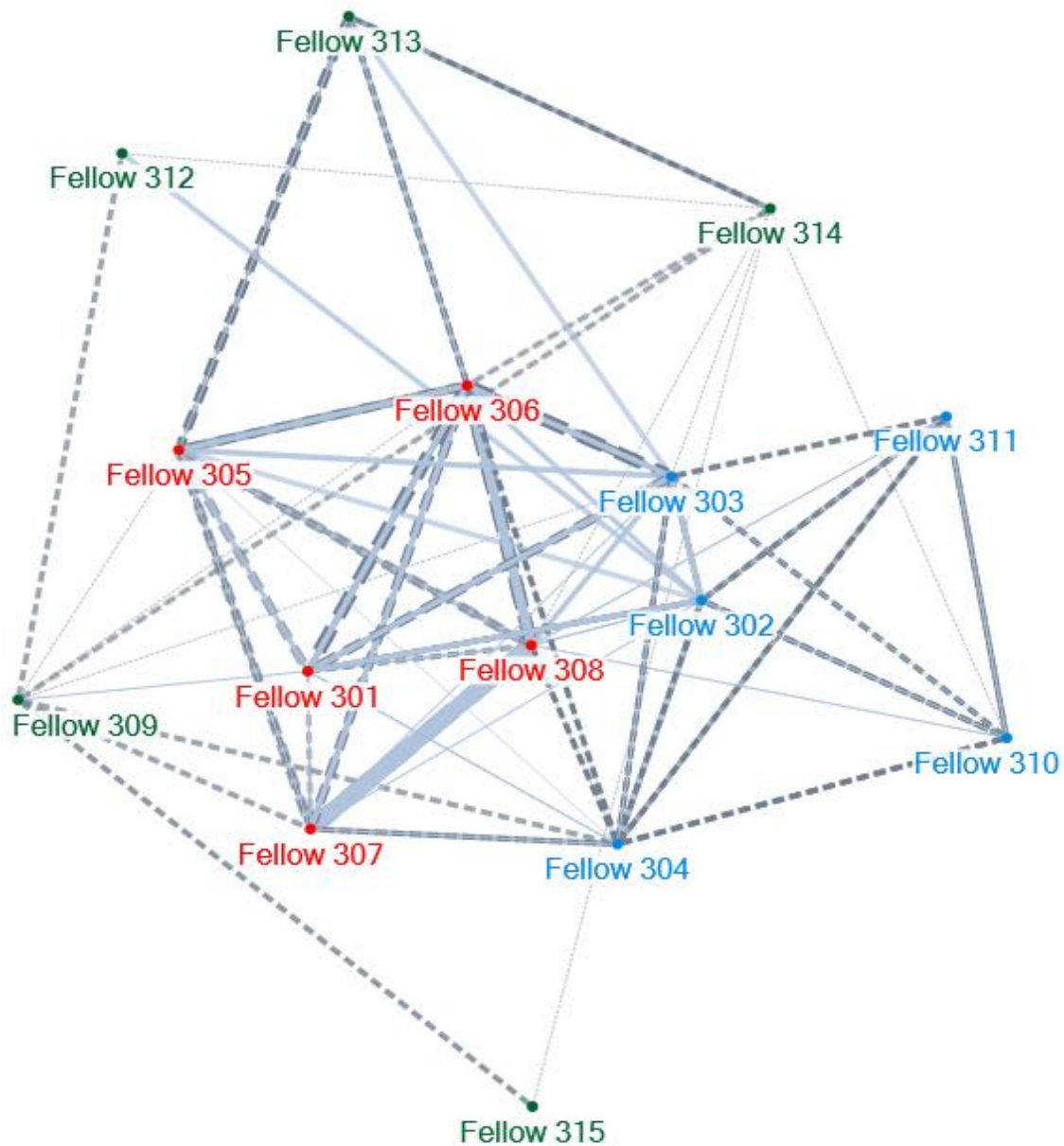
Disciplines

Cohort Three continued the overall trend of a more diverse disciplinary affiliation within the cohort. In Cohort Three, fewer than half of the fellows (six) were in social work, a sharp contrast to the discipline composition of Cohorts One and Two. Perhaps reflecting the lack of a dominant discipline, academic discipline played an indiscernible role in Cohort Three's network shape, as seen in Figure 6. The six social work Cohort Three fellows did maintain strong connections, and had a graph density of 0.8.

Retention

Among the Cohort Three fellows, 10 out of the 15 fellows connected with more than six of the other fellows in their cohort, putting the retention rate for this cohort at 67%. This was double the retention rate reported last year, when Cohort Three was only one year removed from their active time in the fellowship and reported a retention rate of only 33%. Last year, three fellows did not respond to the survey; this year, all fellows responded to the survey and were active in their cohort network. Additionally, only four fellows reported interacting with fewer Cohort Three peers this year; most of the Cohort Three fellows reported higher levels of engagement. Cohort Three essentially bounced back from last year's lower graph density and connectedness. This improvement may reflect greater stability in their own work and professional position, allowing more time to maintain contact with their fellowship peers. Since last year, the small groups within this network have become more pronounced as subgroups within the structure of the cohort network.

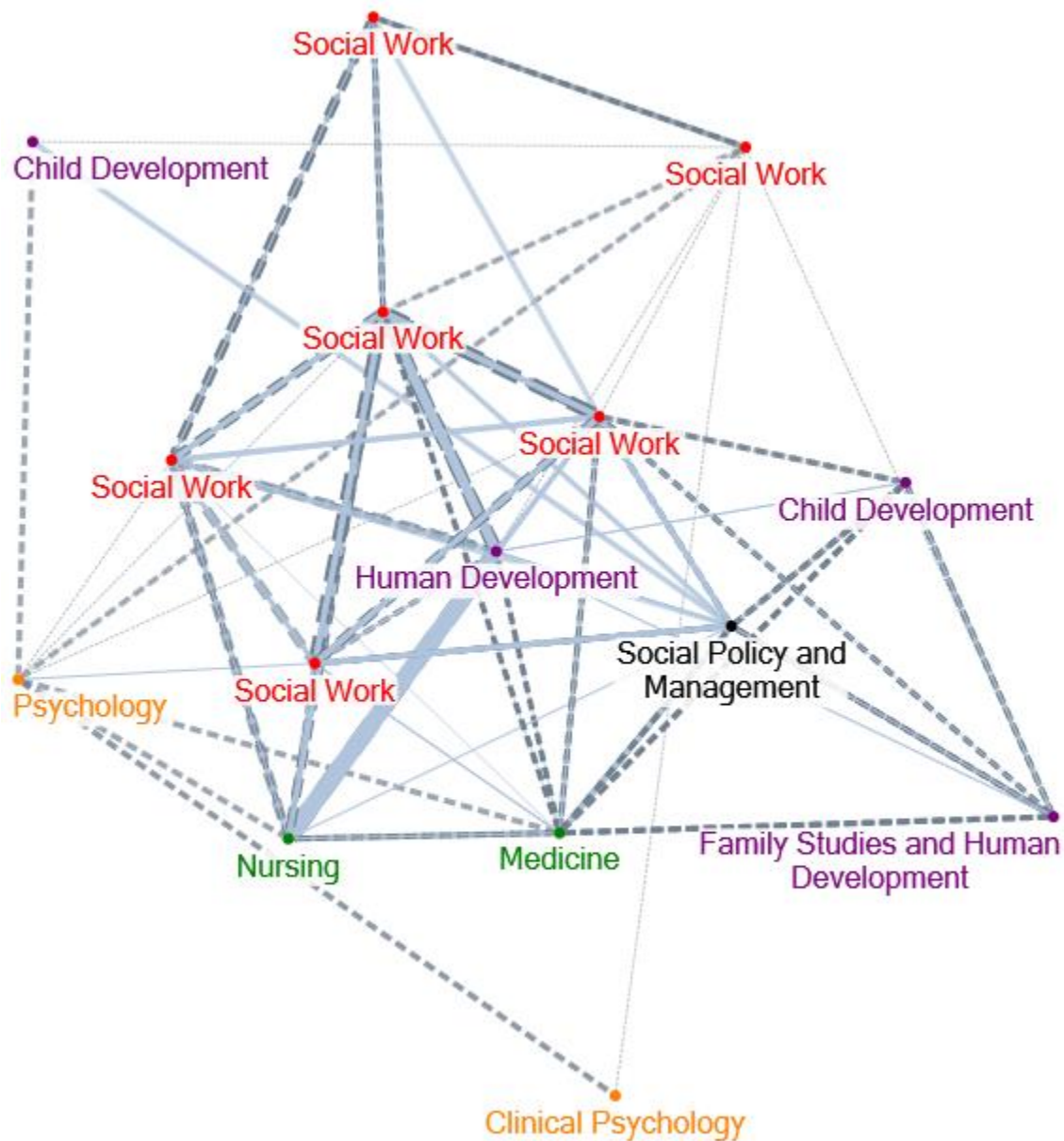
Figure 5. Cohort Three Network: Small Group Affiliation



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.
4. Small group assignment is indicated by color.

Figure 6. Cohort Three Network: Academic Discipline



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.

Table 3. Cohort Three Descriptive Statistics

Cohort Three Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 303	12	0	8.4	Social Work
Fellow 302	10	4	6.62	Social Policy and Management
Fellow 308	10	4	3.67	Human Development
Fellow 306	10	4	3.39	Social Work
Fellow 304	10	4	3.35	Medicine
Fellow 309	9	2	10.05	Psychology
Fellow 305	9	4	2.2	Social Work
Fellow 314	8	4	9.86	Social Work
Fellow 301	8	4	0.37	Social Work
Fellow 307	8	4	0.37	Nursing
Fellow 310	6	-2	1.02	Family Studies and Human Development
Fellow 311	5	-5	0	Child Development
Fellow 313	4	0	0.2	Social Work
Fellow 312	3	-4	0.51	Child Development
Fellow 315	2	-3	0	Clinical Psychology
		Prior Year		
Network Average	7.6	6.3	3.33	
Network Median	8	6	2.2	

Notes:

1. Higher numbers are more advantageous.
2. *Degree*: Number of connections attached to that fellow.
3. *Betweenness*: How important each node/fellow is in providing a “bridge” between different parts of the network.

Cohort Four

Cohort Four was selected in 2014 and graduated from the fellowship in 2016. Figure 7 documents the interactions among the 15 Cohort Four fellows, with the fellows' names color coded to reflect their small group assignment and initial research interests. For this cohort, small group assignments include strengthening parental capacity, improving early child development through more effective interventions, and adolescent development among high-risk youth.

Figure 8 presents the same data with respect to interactions among the fellows but highlights each fellow's specific discipline. As noted in Figure 8, six of the 15 fellows were enrolled in social work programs, shown in red. This is the same proportion of social work fellows found in Cohort Three. The remaining nine fellows cover a wide range of disciplines, making this cohort the most diverse. Other disciplines represented in the cohort include: two fellows in clinical psychology, shown in orange; two fellows in education, shown in pink; and one fellow each in sociology (blue), criminal justice (brown), social policy (black), public health (green), and human development (purple).

Description of the Network

Cohort Four has a graph density of 0.50, meaning that 50% of possible edges (i.e., connections) between fellows occurred. This is a significant decrease in the graph density for this cohort from the previous year, when it was 0.76. While all fellows responded to the survey and were active in this network, three Cohort Four fellows (Fellow 403, Fellow 410, and Fellow 407) did not indicate they had a connection with another Cohort Four fellow. They remained active, however, because one of their Cohort Four peers did say they connected with them at some point during the year. A fourth fellow (Fellow 415) noted having only one interaction of any kind with a peer from her cohort during the year. These four formed the very periphery of the network, as seen in Figure 7.

There was a core group of five fellows in this cohort who had connections with nine or more fellows in their cohort and had the highest betweenness centrality scores of the network. These fellows were not only the most active, but most critical to keeping the cohort engaged, reaching out to the fellows who did not indicate any or many interactions on their own (Fellow 403, Fellow 410, Fellow 407, and Fellow 415). This core group, however, did not align along discipline or small group membership. As this cohort is the most diverse in the Fellowship's history in terms of discipline, it is not surprising that strong collaborations continued for some fellows across discipline and small group boundaries. The fellows at the core of the network were Fellow 411, who had the highest degree (11) in the cohort, like last year; Fellow 409, Fellow 412, and Fellow 402 (all with degrees of 10); and Fellow 401, with a degree of nine.

Small Group Affiliation

In the Cohort Four network, small groups played an obvious role in the network's structure (see Figure 7). Two of the small groups, the ones shown in blue and green, had a graph density of 1.0, meaning that 100% of the possible edges (i.e., connections) between fellows within the small

group occurred. The group shown in red had a strong graph density of 0.9. This group hosted a few more periphery members of the network as a whole. However, it was also home to the fellow with the highest centrality (Fellow 401), likely because of this fellow's connections with each member of the group, which was critical to keeping some of the periphery members of the network engaged.

The strength of these small group connections played an integral role in defining the fellowship experience for the Cohort Four fellows. As Cohort Four moved out of the fellowship, many were searching for and starting new jobs. Even though overall connections dropped, these fellows continued to maintain connections with their small group peers. This speaks to the strong role the small group strategy played for this particular cohort.

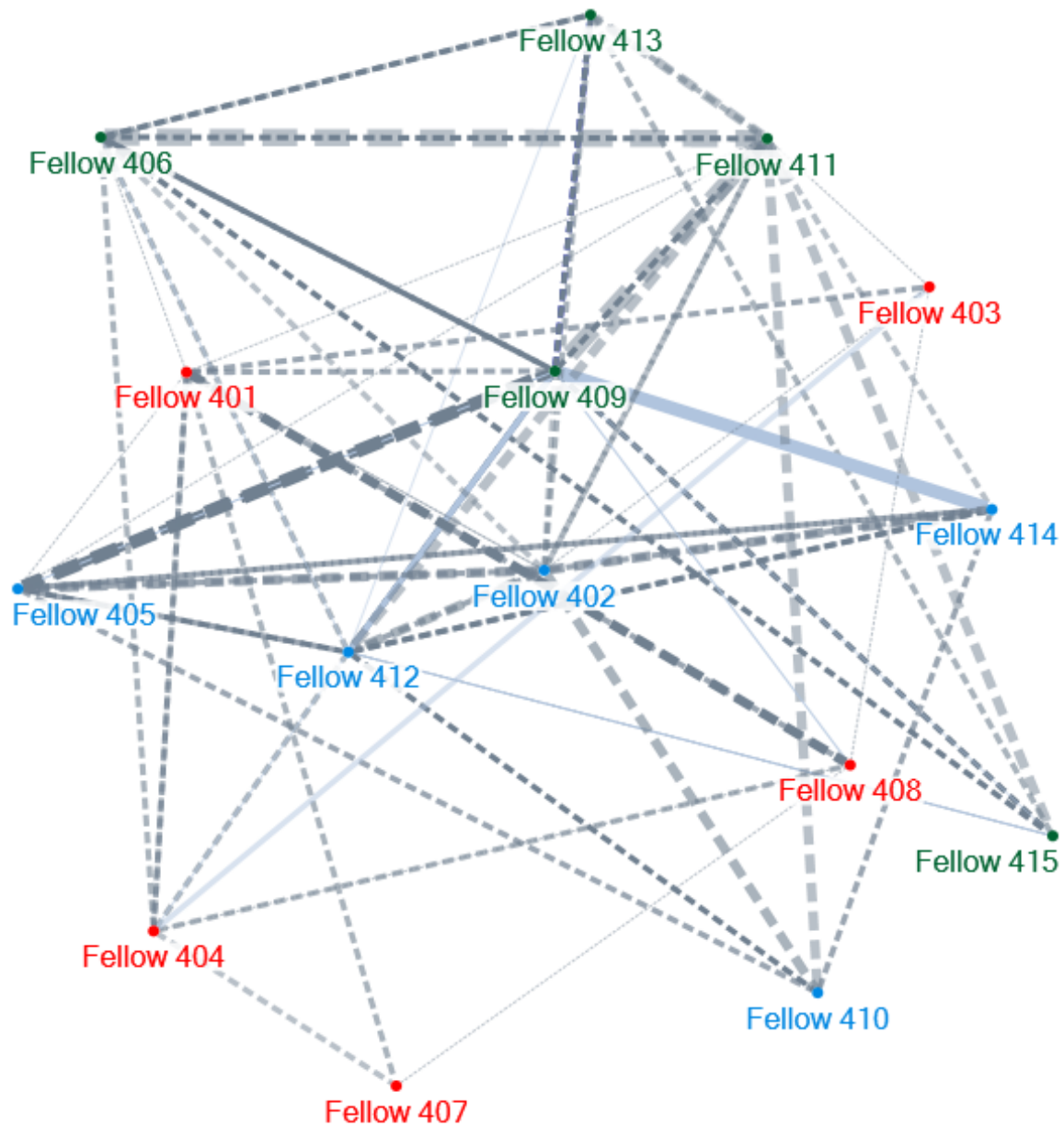
Disciplines

Cohort Four membership reflects the fellowship's overall trend toward greater diversity in terms of academic discipline. In Cohort Four, fewer than half (six) of the fellows were in social work, and the number of disciplines represented is at its highest among all cohorts. In this cohort, network discipline appeared to play a somewhat indiscernible role in network shape, as seen in Figure 8. However, when we look within disciplinary groups in Cohort Four, the fellows in social work exhibited a graph density of 0.47, despite being spread across small groups. Because of the diversity of the cohort, with no other discipline accounting for more than two fellows, no further disciplinary subgroup analysis would be meaningful.

Retention

Among the Cohort Four fellows, seven of the 15 fellows connected with more than six of the other fellows in their network, putting the retention rate for this cohort at 47%. This was a significant drop from last year's retention rate of 100%. All but one fellow interacted with fewer of their cohort peers this year than the prior year. As previously mentioned, the small group affiliation played a more consistent role in shaping the network in this cohort than in other cohorts. The reason for this is not entirely clear. It is possible that as the cohorts become more diverse in terms of discipline, fellows may establish stronger relationships with those in their cohort who share common research interests, which are often relationships that persist beyond the fellowship period. Additionally, patterns observed in the first year post-fellowship may not reflect the level of contact which will occur over time in a given cohort. In the first year following completion of the fellowship, fellows are frequently moving to a new location, adjusting to a new job, and establishing new professional relationships. All of these activities likely impact the time fellows have to invest in the fellowship network, which can explain the drop in retention and average degrees. These findings were consistent with the behavior of Cohort Three the previous year, during their first year out of the fellowship.

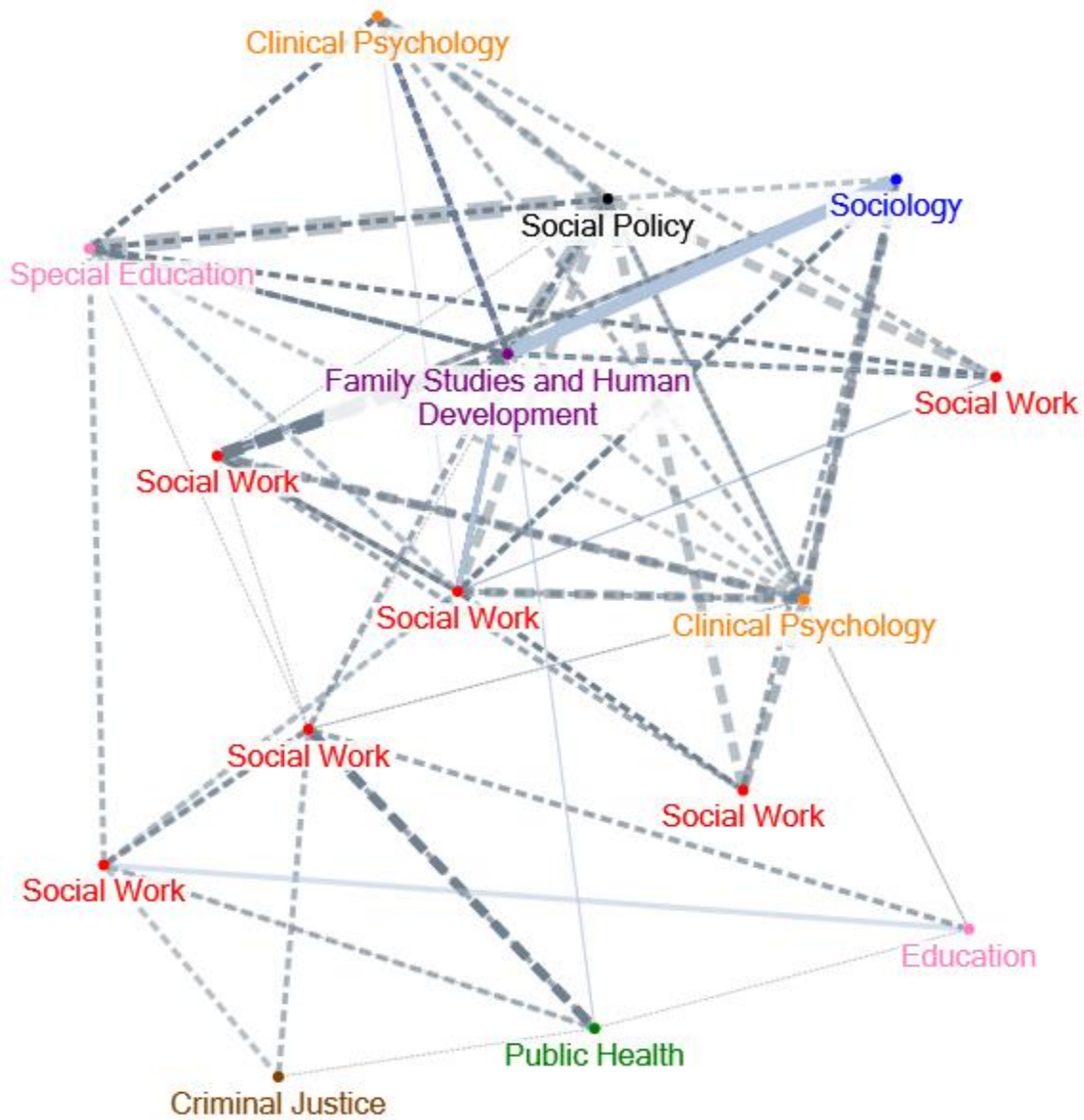
Figure 7. Cohort Four Network: Small Group Affiliation



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.
4. Small group assignment is indicated by color.

Figure 8. Cohort Four Network: Academic Discipline



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.

Table 4. Cohort Four Descriptive Statistics

Cohort Four Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 411	11	-3	9.18	Social Policy
Fellow 409	10	-3	9.22	Family Studies and Human Development
Fellow 412	10	-1	8.34	Social Work
Fellow 402	10	0	6.32	Clinical Psychology
Fellow 401	9	-2	10.88	Social Work
Fellow 406	8	-1	3.32	Special Education
Fellow 405	7	-6	1.55	Social Work
Fellow 404	6	-2	4.54	Social Work
Fellow 414	6	-3	0.29	Sociology
Fellow 413	6	-4	0.2	Clinical Psychology
Fellow 408	5	-3	1.81	Public Health
Fellow 403	5	-4	1.35	Education
Fellow 410	5	-8	0	Social Work
Fellow 415	5	-6	0	Social Work
Fellow 407	3	-8	0	Criminal Justice
		Prior Year		
Network Average	7.1	10.7	3.8	
Network Median	6	11	1.81	

Notes:

1. Higher numbers are more advantageous.
2. *Degree*: Number of connections attached to that fellow.
3. *Betweenness*: How important each node/fellow is in providing a "bridge" between different parts of the network.

Cohort Five

Cohort Five was selected in 2015 and graduated from the fellowship in 2017. Figure 9 documents the interactions among the 15 Cohort Five fellows, with the fellows' names color coded to reflect their small group assignment. For this cohort, small group assignments include training and program implementation, risk and protective factors in child maltreatment prevention, and social determinants/systems.

Figure 10 presents the same data with respect to interactions among the fellows but highlights each fellow's specific discipline. As noted in Figure 10, this cohort was the first to have a dominant discipline other than social work. Six of the fellows were enrolled in various psychology departments, shown in orange in the figure. Of the remaining nine fellows, four were enrolled in social work programs, shown in red; two fellows were enrolled in child development, shown in purple; and one fellow each was enrolled in sociology (blue), epidemiology (green), and community health sciences (green).

Description of the Network

Cohort Five had a graph density of 0.55, meaning that 55% of possible edges (i.e., connections) between fellows occurred. This was a significant increase from the prior year, when Cohort Five had a graph density of 0.39. Cohort Five became a more highly connected group during their final year in the fellowship. Cohort Five had an average degree of connection of 7.7, meaning that, on average, a Cohort Five fellow connected with half of his/her cohort peers during the survey year. This was a significant increase from last year (5.5).

In addition to a high number of connections, there were some high-quality connections occurring, as indicated by the dark lines in Figure 9. Most of the fellows were centered in the core of the network, with few fellows on the periphery (Fellow 501, Fellow 503, Fellow 515, and Fellow 509). During the past year, only a handful of the reported connections were classified as being of lower quality, as reflected in the low number of thin, light lines in Figure 9. Finally, in this cohort, the number of degrees was directly correlated with betweenness centrality, meaning the fellows critical to keeping others engaged were also connected with the greatest number of their cohort peers.

Small Group Affiliation

In the Cohort Five network, small groups played an obvious role in the structure of the overall network. The green group had the strongest graph density, 1.0, meaning 100% of possible connections occurred between the five group members. The other two small groups both had graph densities of 0.8, where 80% of their possible connections occurred. The small group shown in green formed the core of the Cohort Five network, as it did last year, with a strong diamond pattern of high-quality, frequent connections between Fellow 513, Fellow 507, Fellow 508, and Fellow 510. Additionally, these fellows were all in the top half of the cohort in number of degrees and for the most part exhibited higher than average centrality (see Table 5).

It is notable that the red group maintained a high graph density, as these members typically formed the network's periphery. These fellows had fewer interactions with their peers, indicated by thinner lines, and had lower quality interactions, indicated by lighter lines; however, they were still engaging with one another, which gave them a strong graph density.

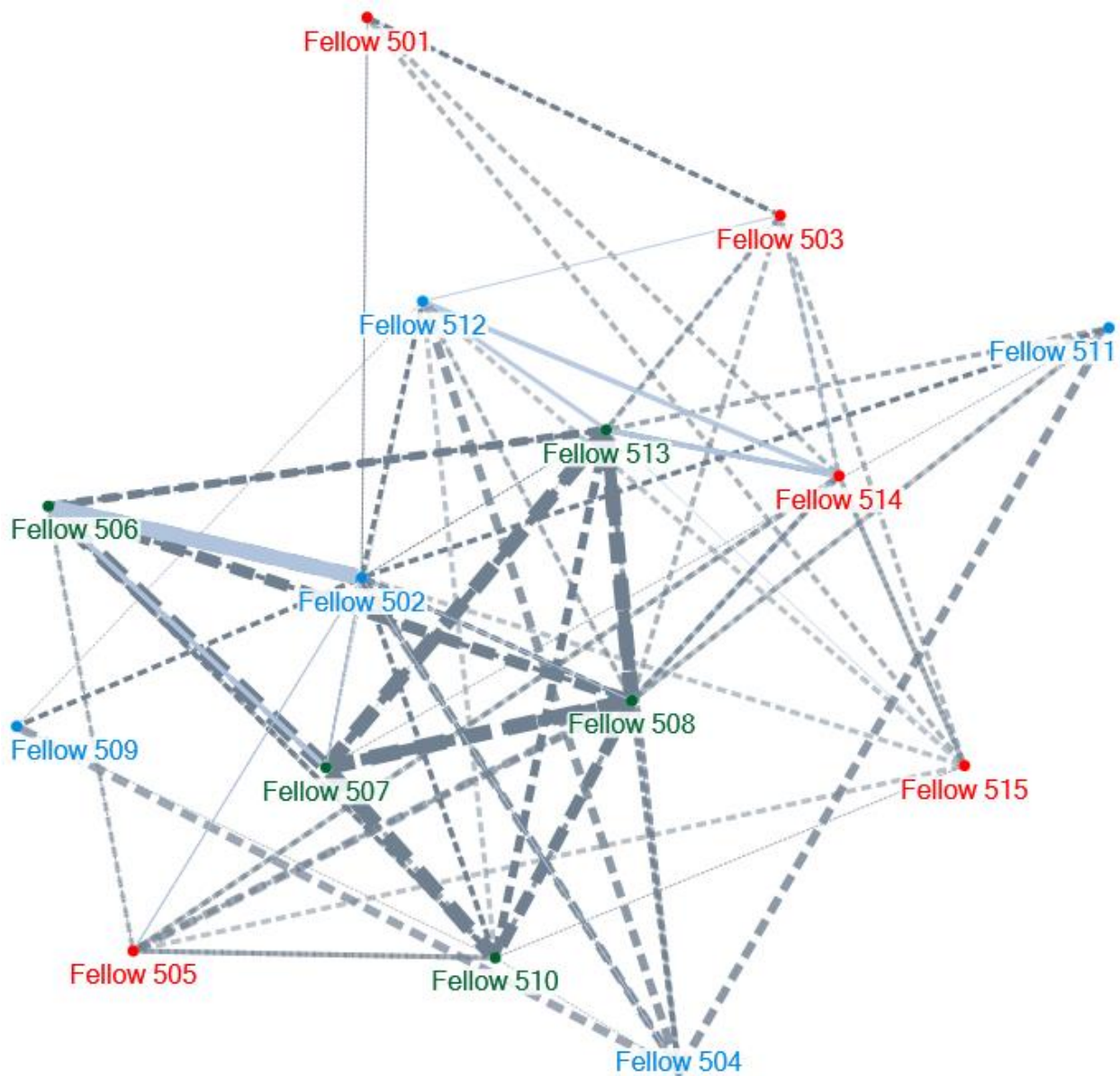
Disciplines

Cohort Five is a disciplinarily diverse cohort with less than one-third of the fellows (four) in social work. In this cohort, discipline played a small role in the network structure, similar to the pattern observed in Cohort Four, as seen in Figure 10. Within Cohort Five, the fellows in social work exhibited a graph density of 1.0, despite being spread across small groups. Additionally, the fellows in psychology, who comprise the majority of Cohort Five, had a strong graph density of 0.67. This was double their graph density from last year. These two disciplines were each clustered together in the overall network structure in Figure 10; however, fellows in social work and psychology also engaged with their cohort's other disciplines.

Retention

Among the Cohort Five fellows, 10 of the 15 fellows connected with more than six of the other fellows in their network, putting the retention rate for this cohort at 67%. This was a large jump from last year, when the cohort was in their first fellowship year and had a 27% retention rate. The Cohort Five retention rate mirrors that of Cohorts One and Three for the highest retention rates in the fellowship. Also notable is that all but three Cohort Five fellows increased their degree (i.e., number of other fellows they connected with) from the prior year, and two of the other three maintained contact with the same number of cohort peers. While the motivation for the increased interaction is unclear, there are a few possible explanations for this pattern. As fellows enter their second year of the fellowship, they are more familiar with one another and may become more comfortable in engaging with one another outside of their disciplines. As discipline diversity increases in cohorts, it may well take longer for cohorts to become more cohesive and collaborative. Additionally, fellows were made aware of last year's network survey results and may have been motivated to take better advantage of the fellowship network and become more engaged going forward.

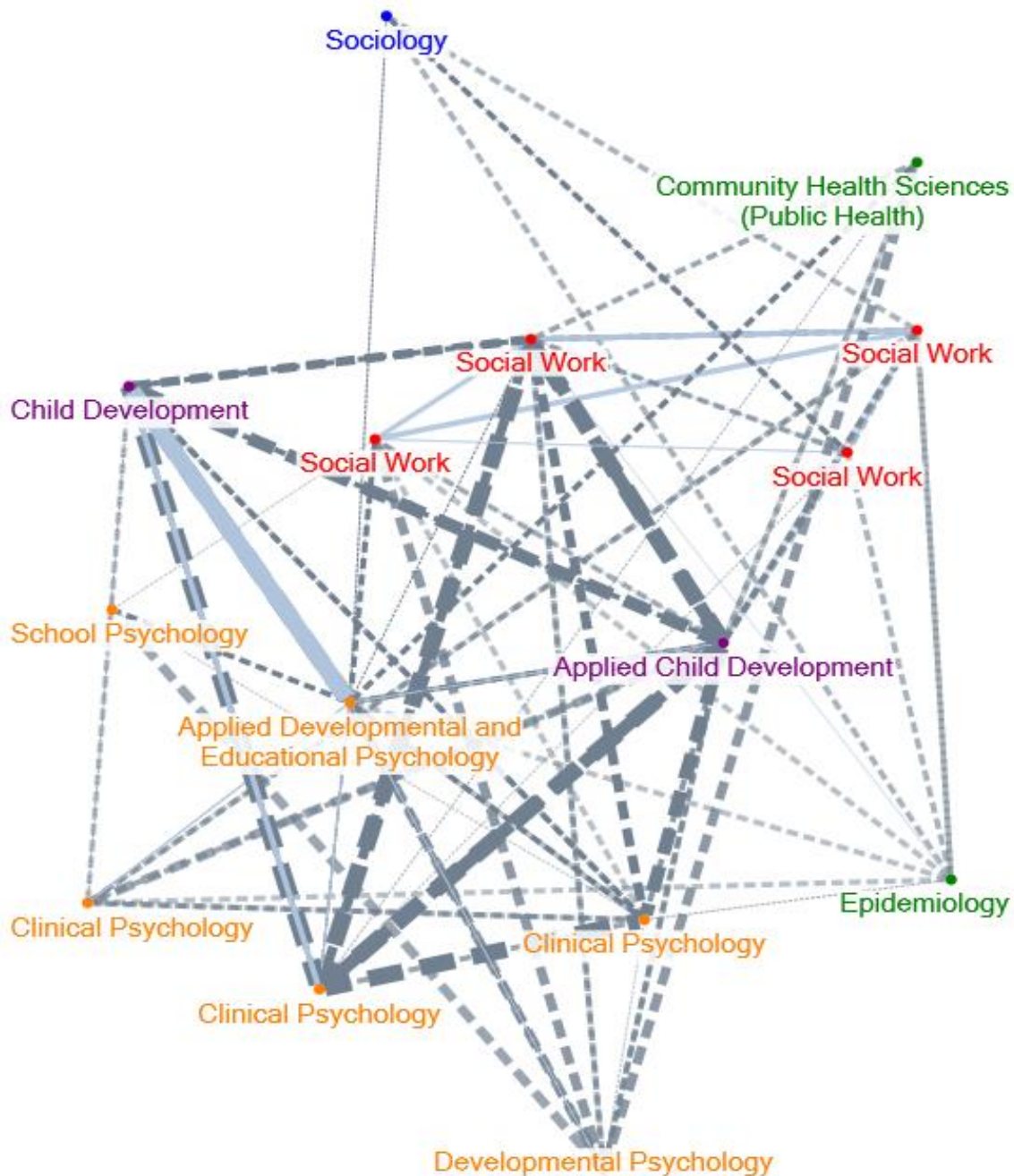
Figure 9. Cohort Five Network: Small Group Affiliation



Notes:

1. Dashed, grey lines represent virtual interactions; solid, blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.
4. Small group assignment is indicated by color.

Figure 10. Cohort Five Network: Academic Discipline



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.

Table 5. Cohort Five Descriptive Statistics

Cohort Five Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 502	12	9	12.89	Applied Developmental and Educational Psychology
Fellow 508	11	3	6.2	Applied Child Development
Fellow 513	11	2	5.76	Social Work
Fellow 512	10	3	5.58	Social Work
Fellow 510	10	6	4.58	Clinical Psychology
Fellow 515	8	3	2.77	Epidemiology
Fellow 507	8	-3	1.88	Clinical Psychology
Fellow 514	7	1	2.01	Social Work
Fellow 503	7	2	1.93	Social Work
Fellow 504	7	4	1.4	Developmental Psychology
Fellow 505	6	0	1.09	Clinical Psychology
Fellow 506	6	2	0.42	Child Development
Fellow 511	5	0	0.17	Community Health Sciences (Public Health)
Fellow 501	4	1	0.33	Sociology
Fellow 509	4	1	0.00	School Psychology
		Prior Year		
Network Average	7.7	5.5	3.13	
Network Median	7	5	1.93	

Notes:

1. Higher numbers are more advantageous.
2. *Degree*: Number of connections attached to that fellow.
3. *Betweenness*: How important each node/fellow is in providing a "bridge" between different parts of the network.

Cohort Six

Cohort Six was selected in 2016 and will graduate from the fellowship in 2018. Figure 11 documents the interactions among the 15 Cohort Six fellows, with the fellows' names color coded to reflect their small group assignment. For this cohort, small groups formed around the unique parenting challenges facing families experiencing poverty, addressing risk and strengthening protective factors, and child welfare policies and interventions to support youth and young parents.

Figure 12 presents the same data with respect to interactions among the fellows but highlights each fellow's specific discipline. As noted in Figure 12, three of the 15 fellows were enrolled in social work programs, shown in red. The remaining fellows cover a range of disciplines, including: five fellows in psychology, shown in orange; two fellows in human development, shown in purple; and two fellows in sociology, shown in blue; two fellows in public policy, shown in black; and one fellow in public health, shown in green.

Description of the Network

Cohort Six had a graph density of 0.48, meaning that nearly half (48%) of all possible connections between Cohort Six fellows occurred outside of mandatory fellowship functions. This lower graph density relative to most other cohorts can be explained by the fact that it was their first year of the fellowship and they were just getting to know one another. This level of interaction outside the planned fellowship meetings and small group projects was comparable to what we observed in other cohorts at this same stage of their history with the program. In fact, this density level was actually 9% higher than what we observed for Cohort Five last year.

The Cohort Six network exhibited an average degree of 6.7, indicating that, on average, the Cohort Six fellows interacted with a little less than half of their cohort outside planned fellowship meetings and work on their small group projects. In this network, fellows with high degrees also exhibited higher betweenness centrality. There was noticeable parity among the fellows both in the degrees and betweenness centrality. There was one outlier (i.e., Fellow 606) who is considerably higher in both, having a higher within-cohort centrality and degree (i.e., 11) than the rest of the Cohort Six fellows. Figure 11 shows that Fellow 606 is at the core of this network, and has made connections with nearly every periphery member of the network—especially Fellow 601 and Fellow 615—which was instrumental to ensuring their sustained engagement. Fellow 611 had the second highest degree and centrality. Figure 11 shows Fellow 611 was a connector between the groups at the top right of the figure and those at the bottom left. This fellow may serve as a bridge between the groups and keep these fellows more engaged than they otherwise would be.

Small Group Affiliation

In the Cohort Six network, small groups played a role in the structure of the overall network. The small group shown in green had the strongest graph density, 1.0, meaning 100% of the

connections that could be made between group members did occur. Strong graph densities were observed in the other two groups, with the blue group reporting a graph density of 0.8 and the red group reporting a graph density of 0.7. This is notable because the survey asks fellows to omit interactions made in order to work on their small group projects. The red group, however, contained more fellows on the periphery of the network than any other group, as shown in Figure 11. The graph also shows that, in addition to most members from the first two small groups connecting with all of their small group peers, these group members interacted frequently and made strong connections, indicated by wide and dark lines. For example, the connections between both Fellow 607 and Fellow 605 with *all* of their group members appear frequent and strong in the green group, and Fellow 610 and Fellow 614 formed a strong collaboration in the blue group. Overall, however, the cohort seems to create interactions and collaborations across small groups in addition to strong connections within their groups.

Disciplines

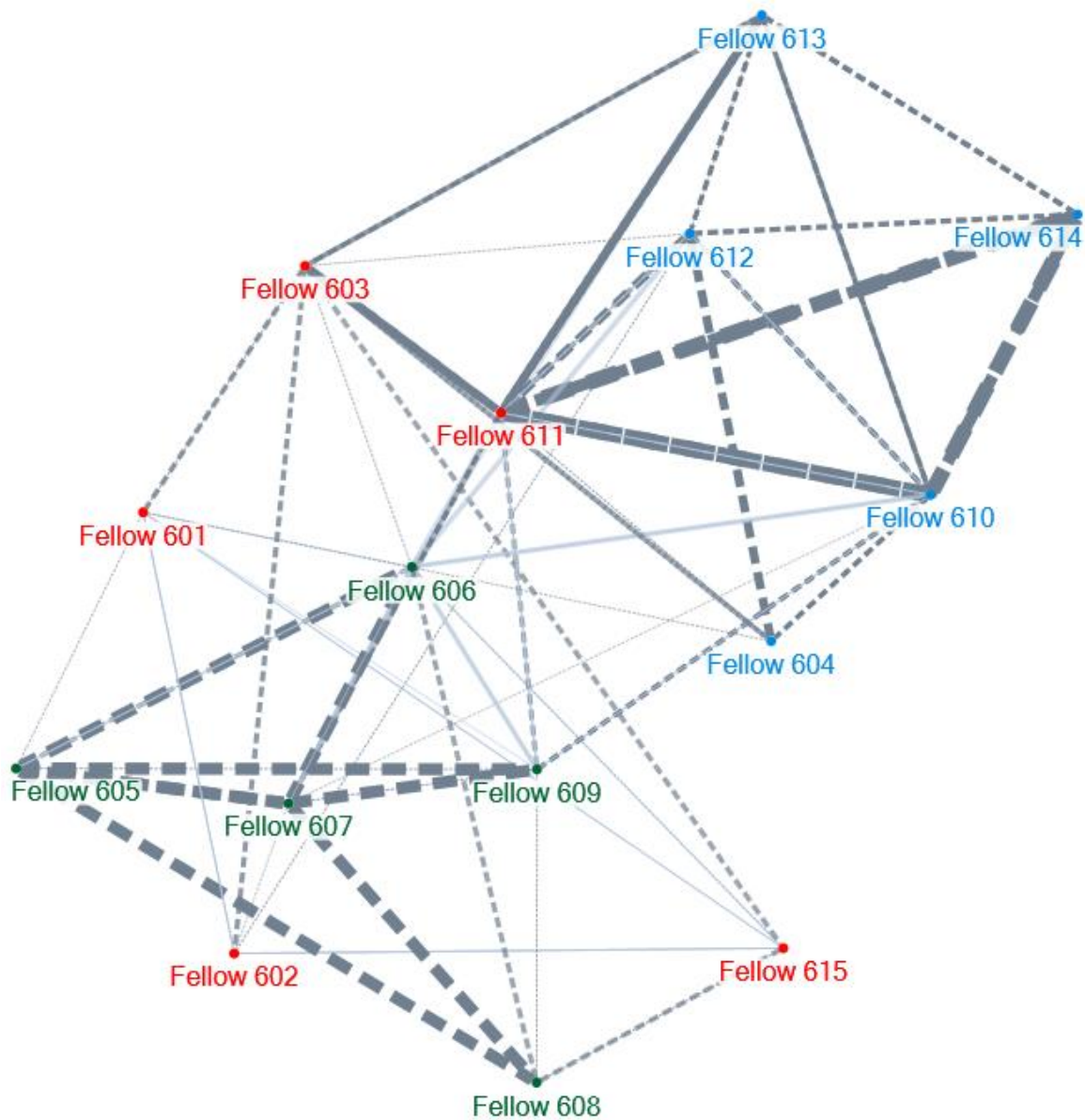
Cohort Six has a diverse group of disciplines among the 15 fellows. In Cohort Six, only three fellows are in social work, while the majority discipline in this group is psychology, similar to Cohort Five. Figure 12 shows that nearly all fellows connected with the other fellows in their discipline, giving every discipline except social work a graph density of 1.0. The three fellows in social work exhibited a graph density of 0.8, despite being placed in the same small group. These three fellows also appeared on the periphery of the network and are not as engaged in the overall cohort network compared to most of their Cohort Six peers. The six psychology fellows, on the other hand, are spread across two small groups yet exhibited a 1.0 graph density. This difference can be seen in the overall network structure in Figure 12, where the psychology fellows clustered together and showed mostly strong and frequent connections, as evident by the dark, wide lines connecting the fellows in the psychology disciplines (shown in orange). It also appears that the fellow in public health established a strong connection with the psychology fellows. Additionally, the figure shows that the public policy, sociology, and human development fellows established their own strong connections with one another. Interestingly, the two sociology fellows reported no interactions with any of the psychology fellows, indicating that, in this instance, there may not have been substantial shared interest in methods, topics, or research design. This shows that while disciplines may play a strong role in establishing connections, the fellows in Cohort Six are collaborating across certain disciplines but not others, and may be connecting over similarities in fields and approaches related to their dissertation work rather than shared disciplinary interests.

Retention

Among the Cohort Six fellows, eight of the 15 fellows connected with more than six of the other fellows in their network, putting the retention rate for this cohort at 53%. This rate falls in the middle of the range of all cohorts' retention rates. Having just completed their first fellowship year, it is surprising that it is not slightly higher. However, the network graphs show that many of the interactions occurred with high frequency, which degree does not capture. In this instance, the retention rate may not be the best indicator of the overall quality of network involvement

for this cohort. Additionally, the minimum number of degrees in Cohort Six is four, meaning every fellow connected with at least four other fellows outside of their time at the fellowship meetings and work done in small groups; this minimum number was among the highest reported across all of the cohorts studied.

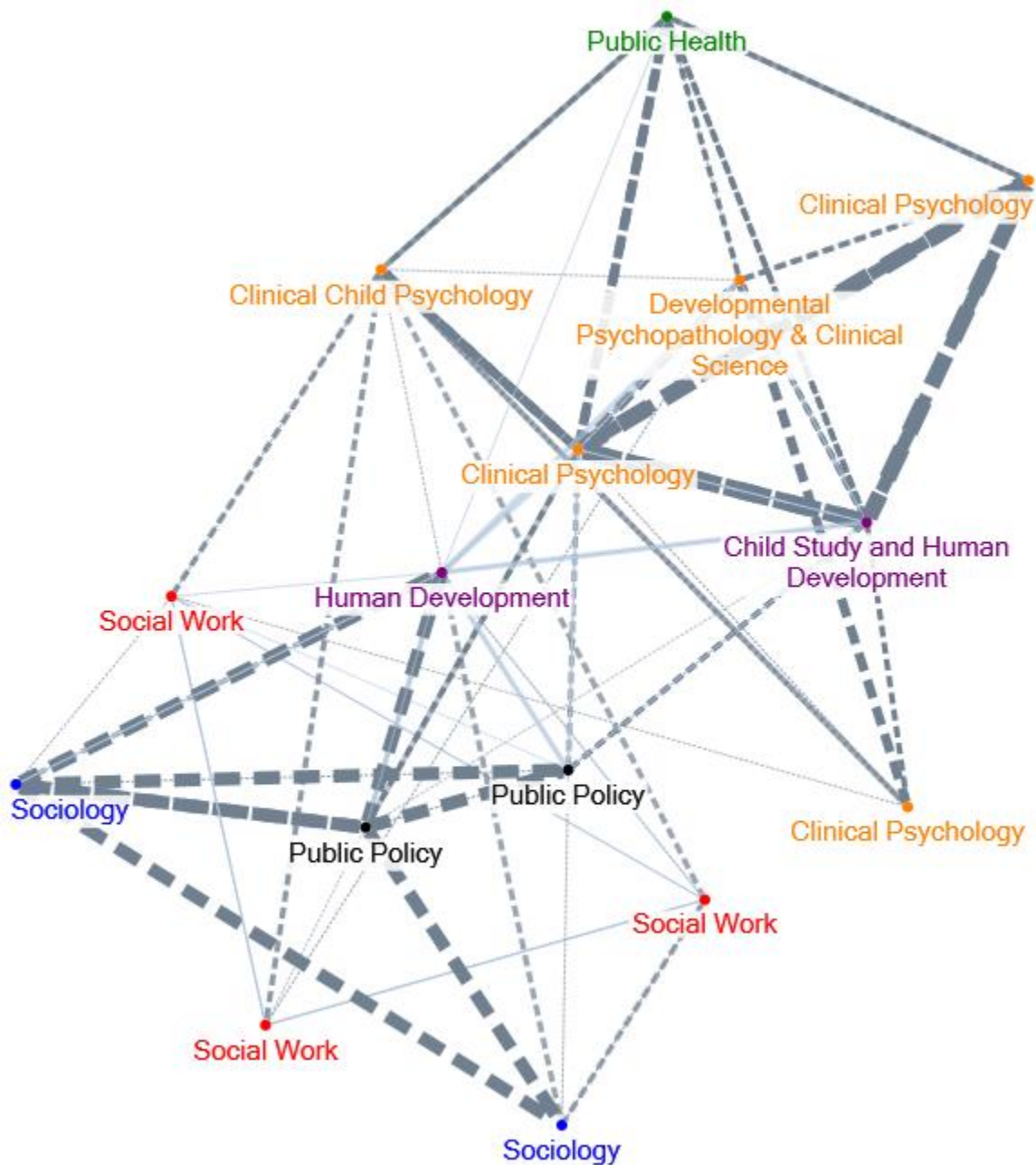
Figure 11. Cohort Six Network: Small Group Affiliation



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.
4. Small group assignment is indicated by color.

Figure 12. Cohort Six Network: Academic Discipline



Notes:

1. Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. The darkness of the line shows the average reported quality of all interactions between two fellows. The darker the line, the higher the reported quality.

Table 6. Cohort Six Descriptive Statistics

Cohort Six Fellow	Degree	Betweenness Centrality	Discipline
Fellow 606	11	15.81	Human Development
Fellow 611	9	6.86	Clinical Psychology
Fellow 610	8	5.45	Child Study and Human Development
Fellow 612	8	5.44	Developmental Psychopathology & Clinical Science
Fellow 603	8	5.41	Clinical Child Psychology
Fellow 601	7	5.37	Social Work
Fellow 607	7	4.52	Public Policy
Fellow 609	7	3.3	Public Policy
Fellow 602	5	1.95	Social Work
Fellow 615	5	1.6	Social Work
Fellow 613	6	1.44	Public Health
Fellow 604	5	1.26	Clinical Psychology
Fellow 608	5	1	Sociology
Fellow 605	5	0.58	Sociology
Fellow 614	4	0	Clinical Psychology
Network Average	6.7	4	
Network Median	7	3.3	

Notes:

1. Higher numbers are more advantageous.
2. *Degree*: Number of connections attached to that fellow.
3. *Betweenness*: How important each node/fellow is in providing a “bridge” between different parts of the network.

Full Fellowship Network

Figures 13 and 14 summarize the reported interactions for the full network, showing all interactions both within and across cohorts (Figure 13) and those only occurring across cohorts (Figure 14). In Figure 13, each fellow's ID and *within-cohort interactions* are highlighted in blue for Cohort One, red for Cohort Two, green for Cohort Three, purple for Cohort Four, orange for Cohort Five, and pink for Cohort Six. In both figures, *across-cohort interactions* are highlighted in grey. The fellowship network had an overall graph density of 0.23, meaning that 23% of all possible connections between all current or graduated fellows in the fellowship network occurred during the reporting period.⁶ This measure of overall network interactions was the same as last year, even though this network now includes 15 additional fellows. While the density of the overall network was lower than the density we observed within each cohort, the number of interactions is impressive given the large number of fellows in the network, the geographic distribution of these fellows, and the fact that any individual fellow was active in the program at the same time as only one-third of the total sample.

The data in Table 7 summarize the 1,848 connections reported across the full fellowship network. Connections are defined simply: Fellow A reported at least one interaction with Fellow B and this is counted as a single connection regardless of the number of times they interacted and the mode in which they interacted (virtually **or** in-person). However, if Fellow A connected with Fellow B both virtually **and** in-person during the reporting period, these interactions would tally as two connections in the calculation of this count. Overall, the range for the number of connections reported by each fellow was 0 to 73 and the mean number of connections per the 90 fellows was 20.5. Exactly one-half of the 1,848 connections (924) were recorded as in-person connections and the other half were virtual (e.g., email, phone). Many of these 1,848 connections (1,356 or 73.4%) were also reciprocated connections—if Fellow A noted they connected with Fellow B *and* Fellow B noted they connected with Fellow A, this is defined as a reciprocated relationship and is tallied twice in this count.⁷

Quality

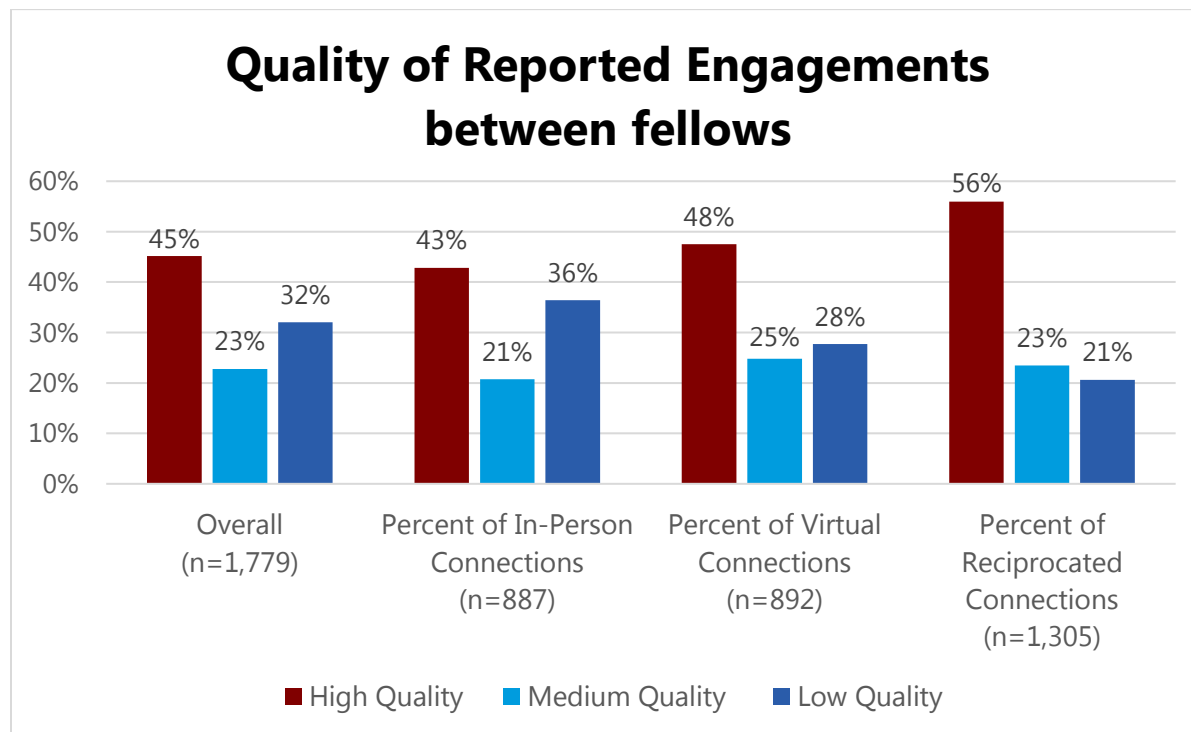
Of all 1,848 connections, fellows gave a quality rating for 1,779 (96%) of the connections. Of these 1,779, 804 (45%) were rated as high quality (either a 4 or 5 on the Likert scale of 1 to 5). An additional 405 (23%) were rated in the middle, and 570 (32%) were given a low quality rating (a 1 or 2 on the Likert scale). Figure 13 shows the quality of engagements as reported across several domains, and that high quality interactions led all types of connections.

⁶ The fellowship network for this survey was the 90 fellows through Cohort Six.

⁷ To estimate the number of unduplicated fellow connections, we can take the number of non-reciprocated connections (492) plus half of the reciprocated connections ($1356/2=678$) and get 1,170 estimated unduplicated fellow connections during the reporting period.

Quality ratings were provided for 887 of the 924 (96%) in-person connection, and 380 of these (42.8%) were rated as high quality. It is interesting and somewhat surprising to note that nearly half (424 of 892, or 47.5%) of the virtual connections given a quality rating were rated as high quality. Additionally, 90% of the high-quality in-person interactions and 91% of the high-quality virtual relationship were reciprocated relationships. Predictably, the higher quality engagements are more likely to be recalled than those of lower quality, where one fellow may have failed to recall the engagement when completing their survey if it was a short, weak connection.

Figure 13. Quality of Reported Engagements: Overall, by Type, and Reciprocated



Cohort-Specific Analysis

The 1,848 reported connections were spread across the six cohorts, though certain cohorts reported more connections than others. Although all fellows completed the survey, there were seven fellows who did not report a single engagement during the reporting year (three from Cohort Four, two from Cohort Two, and one each from Cohorts Three and One). Six of these seven, however, remained somewhat engaged in the network because a different fellow reported an interaction with them at some point. One fellow neither reported an interaction nor was reported by another fellow as connecting over the reporting period, and thus is considered the sole fellow dropped from the network during the reporting period.

Table 7 shows that four of the six cohorts reported similar numbers of total connections—Cohorts Two, Four, Five, and Six reported a range of 259 to 267 connections. Cohort One ($n = 382$ connections) and Cohort Three ($n = 414$ connections) report significantly more connections than their cohort peers. Among the full fellowship network, a total of 613 reported connections

(33%) were within-cohort engagements, while 1,235 (67%) were connections made across cohorts. Across the six cohorts, the proportion of reported across-cohort interactions ranged from 47% (Cohort One) to 69% (Cohort Two).⁸ This relatively high proportion of across-cohort interactions may in part reflect the high number of graduate fellows who attended the Fellowship Mid-Year meeting at Rutgers in 2017. The across-cohort communication may also be the result of more intentional linkages between fellows being made by fellowship staff through promotion of the peer-to-peer mentoring program and other joint learning opportunities. Among the fellows who were in the program during some portion of the reporting period, Cohorts Five and Six, 60% and 65%, respectively, of their fellowship interactions occurred outside of their own cohort. This is likely due to the survey omitting connections made at fellowship meetings and for small group meetings.⁹

Table 7. Full Fellowship Connections: Quality, Type, and Cohorts

	Cohort One	Cohort Two	Cohort Three	Cohort Four	Cohort Five	Cohort Six	Total Fellowship
Total Number of Connections	382	259	414	260	266	267	1,848
% High Quality	51.3	44.0	41.8	27.3	41.7	52.1	43.5
% In-Person	50.3	59.5	59.2	45.0	35.0	46.1	50.0
% Virtual	49.7	40.5	40.8	55.0	65.0	53.9	50.0
% within cohort	52.8	30.6	39.4	45.0	40.1	34.8	33.2
% across cohort	47.2	69.4	60.6	55.0	59.9	65.2	66.8

⁸ When considering cohort-specific analysis of these reports, it is important to remember that the numbers only include the fellow reporting the interaction. For example, if a Cohort Four fellow reported a connection with a Cohort One fellow but that Cohort One fellow did not report the same interaction, then that connection would not be counted in the Cohort One numbers (it would, however, be included as an across-cohort interaction in the Cohort Four calculations). So, while Cohort One's across-cohort interactions were the lowest reported among the six cohorts, this proportion may be understated - Cohort One fellows may not recall all of the times a current or more recent fellow reached out to them for guidance or a request, as it may be more memorable for a junior person to interact with a more senior person and the senior person may not register all of these encounters.

⁹ These calculations do not include the seven fellows who did not report a single interaction for the reporting period.

Academic Discipline

As noted in Table 8, fellows were enrolled in nine different academic discipline categories: 38 in social work or social welfare programs; 22 in psychology programs; nine in human or child development programs; seven in health-related programs such as public health, medicine, or nursing; five in sociology programs; three in public policy programs; two in social policy programs; two in education programs; and one in a criminal justice program. As might be expected given the fellowship's early composition, the most common discipline is social work/social welfare, studied by nearly 43% of the total fellowship network. Of the remaining fellows, only two disciplines contributed 10% or more to the fellowship pool—one-quarter of the fellows come from psychology and 10% come from child or human development.

As summarized in Table 8, the percentage of interactions among fellows who share a common discipline varied, although in several cases the graph density score (i.e., the percentage of possible interactions that did occur) for each discipline exceeded the density reported across the full network. For example, the social work fellows reported a group graph density score significantly above the graph density of the fellowship network as a whole (0.38 versus 0.23). On the other hand, the one-quarter of the fellows in psychology reported only a 0.24 graph density, similar to the full network graph density.¹⁰ This specific pattern may reflect the variation in content and focus of study found among the psychology fellows. In contrast, two disciplines with a relatively small number of fellows reported high graph densities within their discipline. The nine fellows who obtained degrees in child or human development reported a graph density of 0.67, meaning that 67% of the possible connections between the child/human development fellows occurred during the reporting period, an interaction pattern consistent with last year's data for the fellows in the child/human development discipline (0.62). This pattern may in part reflect the distribution of these fellows across cohorts: nearly half (4) are part of Cohort Three while four other fellows are in Cohort Five or Six and, therefore, shared a common enrollment period (the ninth was in Cohort Four). The three fellows in public policy reported the highest percentage of possible interactions, with all three reporting at least one interaction with the others in this discipline group.

¹⁰ The numbers presented in this paragraph and Table 8 do not include the one fellow from Cohort Two, in Medicine, who dropped from the fellowship network last year.

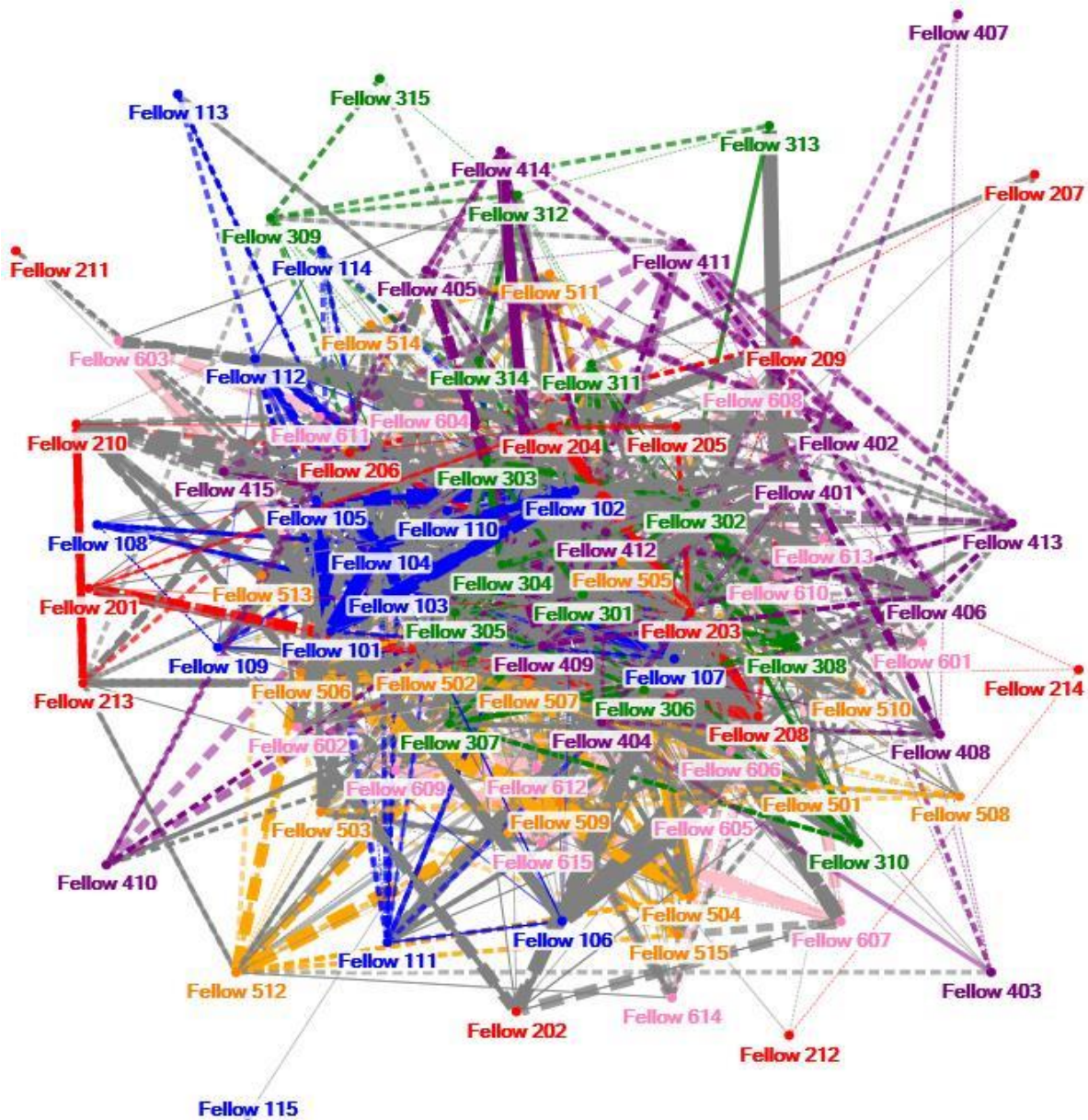
Table 8. Fellows' Discipline and Graph Density

Discipline	Fellows	Graph density	Percent of network
Social Work	38	0.38	42.7
Psychology	22	0.24	24.7
Child/Human Development	9	0.67	10.1
Health Care related	7	0.29	5.6
Sociology	5	0.20	5.6
Public Policy	3	1.00	3.4
Education	2	0.00	2.2
Social Policy	2	0.00	2.2
Criminal Justice	1	N/A	1.1

In addition to cohort and discipline graph density, other factors likely influenced the number and quality of interactions among certain fellows or cohorts of fellows. Most recently, cross-cohort relationships have emerged from participation in the three fellowship sustainability groups, which include more than 20 fellows from Cohorts One to Five. These groups were focused on identifying strategies to sustain the fellowship's mission and its impact beyond the introduction of new cohorts. These workgroups surveyed fellows and held in-person and phone meetings regularly during this network survey period. Additionally, as fellows establish standing at their professional institutions after earning their PhD, they are able to initiate new projects and often reach out to the fellowship network for collaborations. Activities related to various professional associations can enhance cross-cohort interactions, and there are a handful of institutions that employ several fellows across cohorts, which further facilitates cross-cohort engagements. Cross-cohort relationships may have also been fostered by a common academic mentor or policy mentor. For individual fellows, cross-cohort interactions are somewhat correlated with within-cohort interactions ($r = 0.652, p < .01$), meaning that fellows exhibit a

similar degree of connection within their cohort and across cohorts. If one is highly engaged within their own cohort, this person is also likely to be highly engaged across cohorts as well, indicating the fellowship is something individuals are invested in—not just with the cohort they came in with but with the fellowship program as a whole.

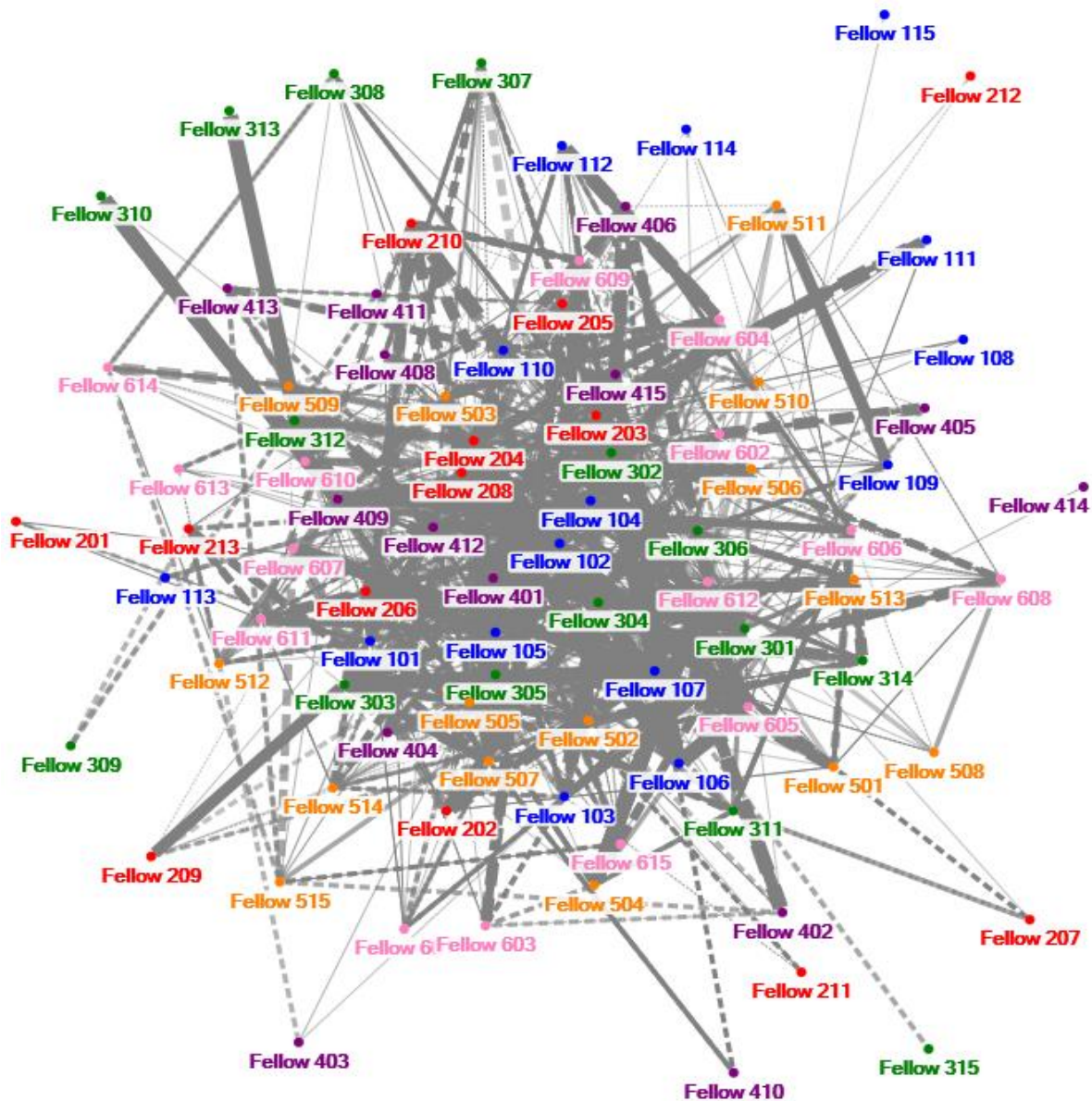
Figure 14. Full Fellowship Network: All Interactions



Notes:

1. Dashed lines represent virtual interactions; solid lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. Blue lines indicate Cohort One's within-cohort interactions.
4. Red lines indicate Cohort Two's within-cohort interactions.
5. Green lines indicate Cohort Three's within-cohort interactions.
6. Purple lines indicate Cohort Four's within-cohort interactions.
7. Orange lines indicate Cohort Five's within-cohort interactions.
8. Pink lines indicate Cohort Six's within-cohort interactions.
9. Grey lines show cross-cohort interactions.

Figure 15. Full Fellowship Network: Cross-Cohort Interactions



Notes:

1. Dashed lines represent virtual interactions; solid lines indicate in-person interactions.
2. The width of the line shows the total number of in-person and virtual interactions between two fellows. The broader the line, the greater the number of interactions.
3. Blue discs indicate a Cohort One fellow.
4. Red discs indicate a Cohort Two fellow.
5. Green discs indicate a Cohort Three fellow.
6. Purple discs indicate a Cohort Four fellow.
7. Orange discs indicate a Cohort Five fellow.
8. Pink discs indicate a Cohort Six fellow.
9. Grey lines show cross-cohort interactions.

Table 9. Full Fellowship Network Descriptive Statistics

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Cohort	Discipline
Fellow 412	58	19	301.935	Four	Social Work
Fellow 303	52	14	278.256	Three	Social Work
Fellow 103	51	20	238.311	One	Social Work
Fellow 107	44	4	153.648	One	Social Work
Fellow 306	44	27	105.827	Three	Social Work
Fellow 409	43	17	134.786	Four	Family Studies and Human Development
Fellow 204	42	9	90.956	Two	Social Work
Fellow 203	41	5	178.27	Two	Social Work
Fellow 308	40	23	114.758	Three	Human Development
Fellow 202	39	4	79.605	Two	Social Work
Fellow 612	35	N/A	64.578	Six	Developmental Psychopathology & Clinical Science
Fellow 513	34	12	64.317	Five	Social Work
Fellow 102	33	0	82.679	One	Social Work
Fellow 104	33	16	57.832	One	Public Administration
Fellow 302	32	22	87.756	Three	Social Policy and Management
Fellow 401	29	4	103.733	Four	Social Work
Fellow 514	29	9	66.814	Five	Social Work
Fellow 105	29	7	44.245	One	Psychology
Fellow 301	29	16	21.385	Three	Social Work
Fellow 502	28	16	44.123	Five	Applied Developmental and Educational Psychology
Fellow 606	27	N/A	52.118	Six	Human Development

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Cohort	Discipline
Fellow 209	27	-4	46.239	Two	Social Work
Fellow 305	27	10	21.905	Three	Social Work
Fellow 507	25	4	28.987	Five	Clinical Psychology
Fellow 508	25	8	20.335	Five	Applied Child Development
Fellow 602	25	N/A	19.642	Six	Social Work
Fellow 515	24	15	19.464	Five	Epidemiology
Fellow 512	24	9	19.017	Five	Social Work
Fellow 109	23	3	52.298	One	Social Work
Fellow 111	23	16	24.856	One	Developmental Psychology
Fellow 404	22	1	44.359	Four	Social Work
Fellow 605	22	N/A	33.58	Six	Sociology
Fellow 206	22	6	24.825	Two	Psychology
Fellow 406	22	0	20.308	Four	Special Education
Fellow 610	21	N/A	40.04	Six	Child Study and Human Development
Fellow 503	21	4	31.806	Five	Social Work
Fellow 609	21	N/A	25.557	Six	Public Policy
Fellow 304	21	5	14.619	Three	Medicine
Fellow 510	20	11	22.737	Five	Clinical Psychology
Fellow 106	20	-4	12.462	One	Social Work
Fellow 509	19	7	32.305	Five	School Psychology
Fellow 607	19	N/A	18.848	Six	Public Policy
Fellow 511	19	6	13.515	Five	Community Health Sciences (Public Health)
Fellow 615	19	N/A	12.309	Six	Social Work
Fellow 613	18	N/A	31.634	Six	Public Health

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Cohort	Discipline
Fellow 415	18	-9	13.898	Four	Social Work
Fellow 611	18	N/A	11.568	Six	Clinical Psychology
Fellow 114	18	9	11.464	One	Social Work
Fellow 314	17	7	49.022	Three	Social Work
Fellow 408	17	1	30.004	Four	Public Health
Fellow 506	17	9	9.391	Five	Child Development
Fellow 402	16	2	23.476	Four	Clinical Psychology
Fellow 504	16	6	12.319	Five	Developmental Psychology
Fellow 505	16	5	10.492	Five	Clinical Psychology
Fellow 608	16	N/A	10.477	Six	Sociology
Fellow 307	16	9	6.021	Three	Nursing
Fellow 108	16	7	3.264	One	Social Work
Fellow 311	15	-12	16.474	Three	Child Development
Fellow 405	14	-17	18.341	Four	Social Work
Fellow 601	14	N/A	10.704	Six	Social Work
Fellow 603	14	N/A	7.264	Six	Clinical Child Psychology
Fellow 604	14	N/A	7.089	Six	Clinical Psychology
Fellow 313	14	3	4.685	Three	Social Work
Fellow 110	14	-5	3.713	One	Social Work
Fellow 411	13	-19	17.516	Four	Social Policy
Fellow 413	13	-5	7.066	Four	Clinical Psychology
Fellow 205	12	-4	0.732	Two	Social Work
Fellow 309	11	1	23.902	Three	Psychology
Fellow 208	11	-2	5.755	Two	Psychology
Fellow 207	10	0	21.719	Two	Public Health
Fellow 614	10	N/A	6.353	Six	Clinical Psychology

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Cohort	Discipline
Fellow 501	10	5	1.679	Five	Sociology
Fellow 112	9	-5	2.366	One	Clinical Psychology
Fellow 310	9	-2	1.221	Three	Family Studies and Human Development
Fellow 213	8	1	4.758	Two	Social Work
Fellow 403	8	-5	2.696	Four	Education
Fellow 101	8	8	0.776	One	Social Work
Fellow 414	7	-3	3.375	Four	Sociology
Fellow 410	7	-11	2.109	Four	Social Work
Fellow 201	7	3	1.391	Two	Social Work
Fellow 312	4	-5	1.207	Three	Child Development
Fellow 210	4	0	0.644	Two	Sociology
Fellow 113	4	-2	0.000	One	Social Work
Fellow 212	3	0	3.09	Two	Psychology
Fellow 211	3	-4	2.154	Two	Social Work
Fellow 315	3	-5	0.189	Three	Clinical Psychology
Fellow 214	3	2	0.059	Two	Social Work
Fellow 407	3	-9	0.000	Four	Criminal Justice
Fellow 115	1	1	0.000	One	Clinical Psychology
Fellow 215	0	-5	0.000	Two	Medicine
		Prior Year			
Network Average	20.02	16.69	37.422		
Network Median	18	15	18.932		

Notes:

1. Higher numbers are more advantageous.
2. *Degree*: Number of connections attached to that fellow.
3. *Betweenness*: How important each node/fellow is in providing a "bridge" between different parts of the network.

Discussion

The first six cohorts of participants in the *Doris Duke Fellowships for the Promotion of Child Well-Being* represent a diverse group of emerging scholars. Through participation in fellowship activities during their two-year fellowship term and through access to the full fellowship network, these scholars have the opportunity to collaborate within and across disciplines with an intentional focus on promoting child well-being. The network survey found that substantial interactions occur between the fellows, both within and across cohorts, beyond interactions at fellowship events and that the interactions are typically of high quality. In their responses, fellows noted collaborating together on journal articles, poster presentations, and other activities. The analysis unveiled a high proportion of across-cohort engagements—two-thirds of all reported engagements by the 90 fellows occurred with someone outside of their own cohort. Potential reasons for this high level of cross-cohort interaction include participation in the sustainability groups; a more robust peer-to-peer mentoring program; increased attendance by graduated fellows at the Mid-Year Meeting; and additional fellowship events at national conferences and professional meetings. As years go on, fellows become increasingly intentional about their connections—both in-person and virtually—and utilize their fellowship connections to further their careers.

Table 10 summarizes the density, betweenness centrality, and retention rate for each cohort in the network and presents an average for the network as a whole. The table also presents the average percentage of across-cohort connections for each cohort and overall. As noted in this table, Cohort Two had the greatest percentage of across-cohort connections, followed by Cohort Six. The relatively high density of Cohorts One and Five accounts in part for the relatively low betweenness centrality exhibited—these networks were less dependent upon individual members and more reflective of a larger sense of the “collective team” that is often found within classes or groups of individuals who are actively enrolled in a “cohort” experience. In contrast, the Cohort Two and Cohort Six networks were less dense, with the shape of the network being driven by a subset of fellows within each of these cohorts that were strongly connected to one another, as reflected in the high betweenness centrality scores, and were more responsible for drawing in less active members into the network. When comparing these numbers to last year’s results, the overall network density was only slightly lower than last year, as displayed in Table 10. Additionally, retention rates dropped for most cohorts, except for Cohort Five. However, Cohort Four was an outlier last year—it not only had 76% density but also 100% retention rate. When taking the median rates of the six cohorts instead of averages, we see the network density and retention rate was higher in 2016-2017 than the 2015-2016 reporting period. The Fellowship network remained well connected, and in some instances showed more strength as time went on.

While offering some insights into the fellowship network’s strength and structure, our annual surveys represent one snapshot of how fellows are relating to those in their cohort and to the fellowship as a whole. It is important to note that an individual fellow may be more or less active

in the network during any given study year due to family, career, or personal obligations. The network itself is also in a state of constant change. Each year, a new group of fellows enters the network, adding additional topics of study. In addition, a certain percentage of current fellows change their institutional affiliations, creating new opportunities for professional development and network building. As a program, fellowship activities also are evolving based on feedback we receive from the fellows and emerging opportunities fellowship staff identify within the broader prevention field. Going forward, we will continue to monitor the trends reflected in these data and work to insure that we maximize the opportunities for within- and across-cohort interactions.

Table 10. Summary of Full Fellowship Network Data, by Cohort

	Cohort One (prior yr)	Cohort Two (prior yr)	Cohort Three (prior yr)	Cohort Four (prior yr)	Cohort Five (prior yr)	Cohort Six	Mean (prior yr)	Median (prior yr)
Cohort-Specific Statistics								
<i>Network Density</i>	0.63 (0.69)	0.36 (0.38)	0.54 (0.45)	0.5 (0.76)	0.55 (0.39)	0.48	0.51 (0.53)	0.52 (0.45)
<i>Betweenness Centrality</i>	2.433 (1.600)	4.42 (4.733)	3.333 (4.133)	3.80 (1.667)	3.133 (4.600)	4.00	3.519 (3.347)	3.567 (4.133)
<i>Retention Rate</i>	0.67 (0.67)	0.07 (0.27)	0.33 (0.33)	0.47 (1.00)	0.67 (0.27)	0.53	0.46 (0.51)	0.5 (0.33)
Percent of Cross-Cohort Interactions^a	47.2	69.4	60.6	55.0	59.9	65.2	66.8	60.3

^a This calculation was not included in last year's report.

References

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