A decorative graphic on the left side of the page consists of a vertical column of colored squares. From top to bottom, the colors are dark red, dark blue, medium blue, light blue, and bright blue. To the right of this column, there are several other squares of various colors (dark blue, light blue, dark red, medium blue, and red) arranged in a stepped, descending pattern from left to right.

Doris Duke Fellowships for the Promotion of Child Well-Being: Network Analysis Report 2017–18

July 2019

[Colleen Schlecht and Deborah Daro](#)

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Doris Duke Fellowships for the Promotion of Child Well-Being: Network Analysis Report 2017–2018

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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 child well-being by applying research-based solutions to policy and practice challenges. The fellowships' 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 child well-being 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, informal meetings at relevant national conferences, peer mentoring, and shared research projects.

For the past five 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 fellowships' initial seven cohorts. Of these 105 individuals, 30 were still enrolled during the data collection period (July 2017–June 2018) and 75 had graduated the fellowships before June 2018.

Key Findings

We present findings on how each individual cohort performed over the report period, including how specific characteristics impacted the number and quality of fellow interactions. Because we have replicated this survey and analysis for five years, we describe trends over time for cohorts who participated in multiple years. We then discuss the connectivity of the network as a whole, including connections that occur across cohorts and across disciplines. We also provide information on the quality of connections occurring within the full fellowships network.

Summary of Within-Cohort Interactions Findings

Cohort One

During 2017–18, 14 of the 15 Cohort One fellows were in contact with each other, the same as the previous year. Out of the 15 fellows in Cohort One, 10 are in contact with more than six other fellows, for a retention rate of 67%, a statistic similar to the rate reported in the previous two years.

Six Cohort One fellows reported interacting with more of their Cohort One peers this year compared to last year, while six reported interacting with fewer of their cohort colleagues. Members of two of the small groups in this cohort sustained their robust pattern of interaction established during the fellowship.

Cohort Two

During 2017–18, 80% of Cohort Two fellows were in contact with each other, a pattern consistent with last year’s survey. Unlike Cohort One, a relatively small number of fellows in this cohort maintain contact with a large number of their cohort members. Only one fellow reported interactions with at least half of their cohort (a 7% retention rate). This pattern is consistent with the level of activity reported in prior years, although three fellows reported a greater number of contacts with other Cohort Two fellows this year in contrast to last year. In terms of small group connections, only one small group within this cohort sustained interactions over time.

Cohort Three

During 2017–18, all 15 Cohort Three fellows reported contact with at least two of their cohort peers. Among the Cohort Three fellows, seven out of the 15 fellows connected with more than six other fellows in their cohort, putting the retention rate for this cohort at 47%. While still strong, this retention rate is significantly below last year’s retention rate of 67%.

As reflected in the retention statistic, eight of the Cohort Three fellows reported connecting with fewer of their cohort peers this year than last year. Despite this pattern, two of the small groups maintained strong contact over the past year.

Cohort Four

During 2017–18, all 15 Cohort Four fellows were in contact with at least three of their cohort peers. Among the Cohort Four fellows, 10 of the 15 connected with more than six of the other fellows in their network, increasing the cohort’s retention rate to 67% from 47% reported last year. Only five of the fellows reported fewer interactions with others in their cohort this year than in last year’s survey.

In contrast to other cohorts, small group affiliation played a stronger, more consistent role in fostering sustained interactions and provided key structural support for this cohort’s overall network. While fellows rated the quality of these interactions as slightly lower than in prior years, the number of interactions among members within each small group remained consistent.

Cohort Five

During 2017–18, all 15 Cohort Five fellows were in contact with at least one of their cohort peers, keeping all fellows active in their cohort network. Among the Cohort Five fellows, six of the 15 fellows connected with at least half of the other fellows in the cohort, putting their

retention rate at 40%, a significant drop from the levels of interaction last year (67%). All Cohort Five fellows reported the same number or fewer connections this year than in the previous year. This decrease in the total number of connections and number of cohort peers with whom a fellow interacts matches patterns we have observed in other cohorts in the year after they graduate from the program. This year is a time of significant change for the fellows as they work on publishing their dissertation and focus on establishing themselves in a new job. As fellows move forward in their careers, they replace within-cohort interactions with broader involvement with fellows in other cohorts. Reflecting this shift, Cohort Five fellows reported high levels of engagement with fellows outside of their cohort, indicating they remain active and find value in the broader Fellowships network.

Cohort Six

During 2017–18, all 15 Cohort Six fellows were in contact with at least six of their cohort peers. Among the Cohort Six fellows, all but one connected with at least half of the other Cohort Six fellows, putting the retention rate for this cohort at 93%. This rate is the highest among all cohorts, and is a significant increase compared to the prior year (53%). This increase is not unexpected. It reflects fellows' increased familiarity with their cohort peers and their openness to seeking advice from other cohort members as well as offering assistance. Given that these interactions do not include fellowships-sponsored events, such as annual and mid-year meetings or small group interactions, this level of connection is impressive and speaks to the value fellows place on the network.

Both small group assignments and academic disciplines played a role in shaping the network of Cohort Six fellows. All of them have very strong within-group connections.

Cohort Seven

During their first year in the fellowships, all Cohort Seven fellows connected with at least four of their cohort peers outside of mandatory program events. Among the Cohort Seven fellows, nine fellows connected with more than half of the other fellows in their cohort, yielding a retention rate of 67%.

During the first year of participation, small group assignments often play a role in shaping the pattern of relationships fellows form. Within this cohort, early patterns of connections were influenced by small group assignments, with fellows reporting more frequent interactions with the four other fellows in their small group than with others in their cohort. Again, these interactions occur outside of meetings held to coordinate the mandatory small group project.

Summary of Full Fellowships Network Findings

Overall Interactions

In FY18 (July 2017–June 2018), fellows reported a total of 2,498 connections across the full fellowships network, which is 35% more than the total number of connections reported in FY17.

Many of these connections (1,638, or 65.6%) were reciprocated connections and were counted twice. For example, if Fellow A noted they connected with Fellow B in person and Fellow B noted they connected with Fellow A in person, this is defined as a reciprocated relationship and is tallied twice in this count. Additionally, if Fellow A reported connecting with Fellow B virtually and in person—regardless of the number of times—that connection is tallied twice. Therefore, for every pair of fellows, the number of connections can range from 0 to 4. Our best estimate of the number of unduplicated interactions is 1,679.¹

The graph density of the entire fellowships network is 0.218, meaning that 21.8% of all possible connections that could occur did occur in FY18, a slight decrease over the possible connections identified in FY17. A decrease in graph density is not unexpected over time when new members are added to the network. In this case, 15 new fellows joined the network in 2018. Overall, the number of connections reported by each fellow ranged from 1 to 63, with the “average” fellow reporting 22.6 connections. Slightly more than half of the 2,498 connections (1,264) were recorded as in-person connections, while the other half were virtual (e.g., via email or phone).

Of all reported connections, 69.7% reflected connections with fellows from different cohorts, a 4% increase in the proportion of cross-cohort interactions over the previous year. Once again, strategies such as increased graduated fellow attendance at an annual in-person meeting, purposeful connections between current and former fellows, the sustainability work groups, and peer mentors contributed to these cross-cohort connections and relationships.

Quality

Fellows rated their interactions with other fellows on a 5-point Likert scale, choosing from a continuum of weak to strong connections. Of the connections assessed for quality, nearly half (1,046, or 45%) were rated high quality (a 4 or 5 on the scale) and 36% were rated low quality (a 1 or 2 on the scale). While the proportion of interactions rated as being of high quality remained unchanged from last year, the proportion of interactions rated as low quality increased by 4%.

Academic Discipline

Fellows self-identified as one of nine different academic disciplinary categories listed on the survey (child/human development, criminal justice, education, health care/public health/health policy/epidemiology, psychology, public policy, social policy, social work, and sociology). Within these broad disciplines, the four fellows enrolled in public policy programs reported the highest within-discipline density, with 67% of all possible connections among these fellows being made. In contrast, fellows in social work programs ($n = 41$) and those in child/human development

¹ To estimate the number of unduplicated fellow connections (by type of connection), we can take the number of non-reciprocated connections (860) plus half of the reciprocated connections ($1638/2=819$) and get 1,679 estimated unduplicated fellow connections during the reporting period.

programs ($n = 11$) each reported graph densities of 0.42, meaning 42% of all possible connections among those fellows in each of these subgroups were reported.

Conclusion

The first seven cohorts of participants in the *Doris Duke Fellowships for the Promotion of Child Well-Being* represent a diverse group of emerging scholars. As in our prior surveys, this year's survey documented substantial interactions between the fellows, both within and across cohorts. These interactions go beyond fellowship-sponsored events, suggesting that lasting and reciprocal relationships are being formed among the fellows. When comparing these results to last year, the overall network density is only slightly lower, suggesting that many connections are being sustained even as the network expands to include new members. Within-cohort retention rates varied—some increased, some dropped, and some stayed the same. However, the Fellowships network remains well connected and is providing fellows with an important resource to promote interdisciplinary learning and research that can improve child well-being practice and public policy.

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 report over a decade ago 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” (Walker, Golde, Jones, Buseschel, & Hutchings, 2007, p.3). More recently, editors Daro and Cohn Donnelly reflected on child maltreatment research and practice in the opening chapter of a book about the advances in child abuse prevention knowledge. They noted that “the most effective solutions [to prevent child maltreatment] are increasingly ones that embrace an array of strategies targeting all levels of the ecological framework” (Daro & Cohn Donnelly, 2015, p.4).

The design and implementation strategies of the Doris Duke Fellowships for the Promotion of Child Well-Being reflect this thinking regarding doctoral education and training. From the onset, the fellowships recognized the challenges facing the child abuse prevention field and the importance of innovation and new frameworks for conceptualizing the issue and crafting an effective response. Since being established in 2010, eight cohorts of fellows have been selected, resulting in 120 emerging scholars working across disciplines to collectively address emerging challenges in the field. The fellowships’ 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 child well-being 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 informal meetings at related national conferences, peer mentoring, and shared research projects.

For the past five years, we have surveyed current and graduated fellows regarding their connections with other fellows both within and outside their cohort. This document reports on the results of our most recent survey of the initial seven cohorts. Of these 105 individuals, 30 were still enrolled in the fellowships for the data observation period (July 2017-June 2018) and 75 had graduated the fellowships before June 2018. All 105 fellows responded to this survey, for a 100% response rate. This sustained sample and repeated survey allows us to assess the frequency and quality of interactions fellows enjoy with their colleagues while in the program, and 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 Six.

We used social network analysis 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 fellowships, these relationships cross disciplinary boundaries and fellows from diverse disciplines form strong connections. Additionally, fellows are creating ties with fellows outside of their cohort, indicating the full network and its vast knowledge and expertise is open and available to all 105 fellows. This may be particularly critical 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” (Freeman, n.d.). Unlike other approaches, “the fundamental distinction of social network analysis research is that relationships—who is connected to whom—are of paramount importance in explaining behavior. . . network analysis offers many exciting tools and techniques useful in research” (Valente, 2010, p. vii-viii). Because social network analysis emphasizes the importance of relationships to explain behavior, we use this method to look at the relationships formed in, and because of, the fellowships as well as the strength of such connections.

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. Fellows are placed in small groups during their two years in the fellowships; fellowships staff create these groups of five fellows around certain topics (3 groups per cohort). We also examine how frequently relationships develop across the seven cohorts 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 REDCap to all 105 fellows in Cohorts One through Seven. Fellows were asked to report the number of interactions they had with other fellows, both within and outside their cohort, between July 2017 and June 2018 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 contact 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 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 Six and Seven were asked **not** to include interactions that occurred during the two required fellowships 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 fellowships interactions among current fellows during 2017–18.

For contact to be included in the analysis, only one fellow is required to report the connection. 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. Connections are defined simply: if Fellow A reported at least one interaction with Fellow B, 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.

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. A fully opaque line of a darker color signifies interactions of the highest quality. 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 use terminology commonly employed in reporting network analysis. These terms and related definitions are noted below.

- **Edges** are the connections between individuals 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 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 (*not* the number of times they connected with other fellows). 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.” The width indicates the “frequency” of these contacts along the scale. The opacity indicates 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 data for the full fellowships network. For each cohort, we visually present the network in two graphs. The first shows small group affiliations via shared colors. The second notes 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, 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 fellowships in 2013. Cohort One had 14 active fellows, who exhibited a high graph density of (60%) and an average degree of 7.9 direct connections (described in more detail below). Within this cohort, one fellow did not interact with any other fellow *within the cohort* during the year. The fellow has dropped out of this network. Figure 1 shows the interactions among the active 14 Cohort One respondents, with the fellows' unique identifier color coded to reflect their small group assignment. For Cohort One, the fellows were split into three small groups that centered on 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 a social work program while in the fellowships, shown in red. Of the remaining four active fellows, three were in psychology (orange) and one was in public policy (black).

Description of the Network

Cohort One has a graph density of 0.60, meaning that 60% of possible edges (i.e., connections) between Cohort One fellows occurred during this reporting period. This was slightly lower than last year (0.63). Of the 14 active fellows, most exhibited both high degrees of connection and fairly robust connections. Four of the fellows (Fellows 101, 105, 111, and 113) reported contact with at least 10 of their peers within the Cohort One network.

The Cohort One network exhibited an average degree of 7.9, 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 the highest degrees also exhibited the highest 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. Additionally, among all reported Cohort One connections with quality ratings (98.6% of connections), 56% were rated high quality (a 4 or 5 on a 5-point Likert scale).

The fellows who form the center of the network were Fellows 105, 111, and 113. These three fellows had the highest degrees in the network. They, along with a few others, had a high number of high-quality, frequent interactions, as indicated by the dark, wide lines connecting them in Figure 1. 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 blue group, Fellows 111 and 105 maintained their strong relationship, shown by the wide and dark lines connecting them. However, they were not as strongly connected to other members of their small group. Similarly, Fellows 110, 112, and 106 formed a strong connection in the purple group. Both of these groups also had a strong graph density—the former with density of 1.00 (i.e., all fellows in this group connected with each other) 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., Fellows 102, 103, and 114) had only weak ties with one another and with the Cohort One network as a whole; their group graph density is 0.17. 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 fellows in the other two groups.

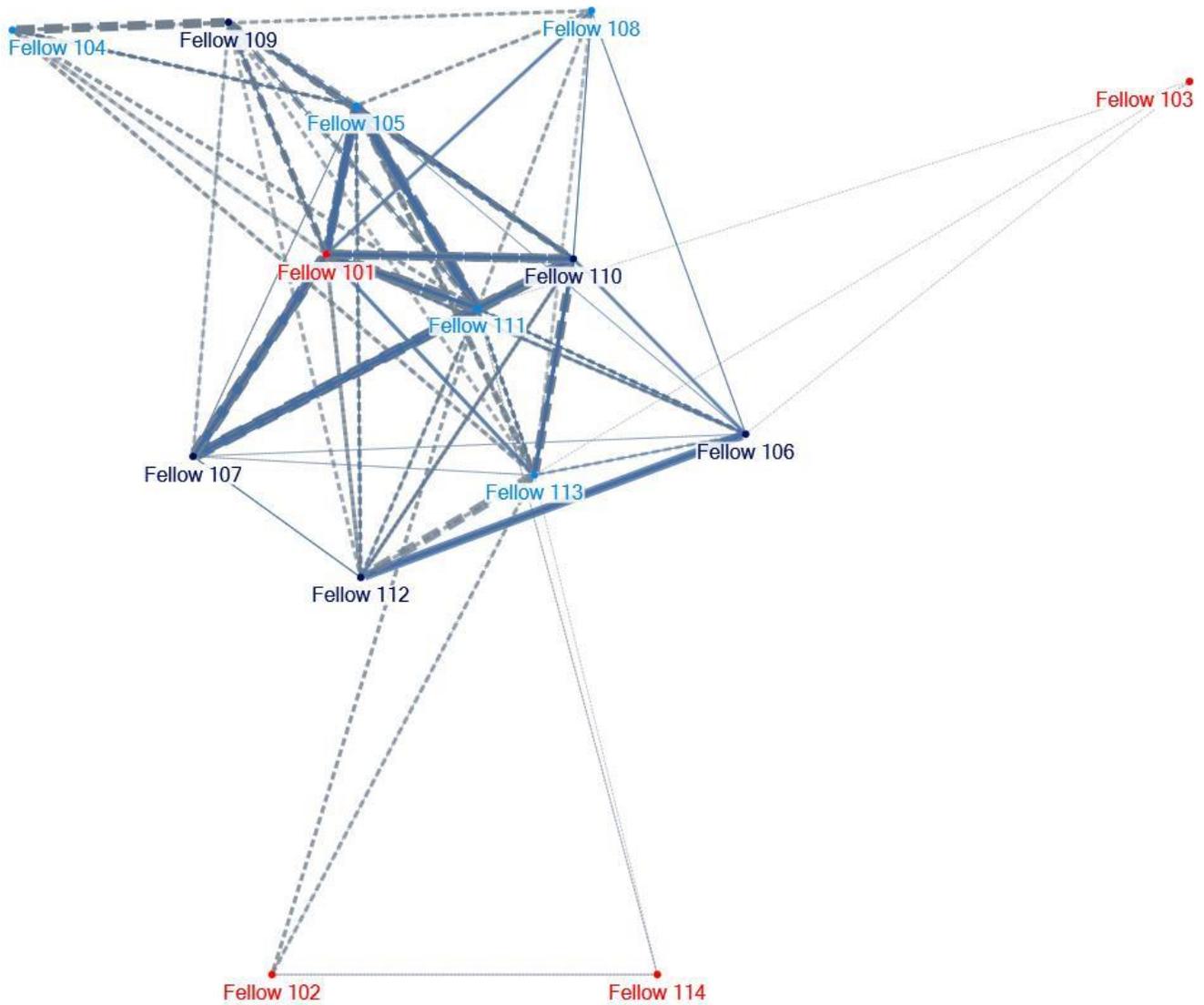
Disciplines

The effect of disciplines 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 interdisciplinary connections (see Figure 2). Among all Cohort One within-cohort connections, 38.5% were interdisciplinary. Indeed, many of the social work fellows are clustered in an obvious group with a graph density of 0.64; fellows in a psychology discipline had a graph density of 0.33. Additionally, the relative strength of connections between Fellow 113, a fellow in public policy, 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

All but one of the Cohort One fellows were still in contact with at least one other fellow in this cohort during the sample period. There were only five fellows with fewer than seven degrees. Figures 1 and 2 show these individuals on the periphery of the network, possibly at risk of losing contact with the group. The cohort's retention rate was 67% (10 out of 15 have a degree of seven or higher), a statistic the same as the rate reported in the previous two years. Six Cohort One fellows reported interacting with fewer peers this year compared to last, while six reported interacting with more of their cohort colleagues, as shown in Table 1. This suggests the cohort maintains its strong connections over time.

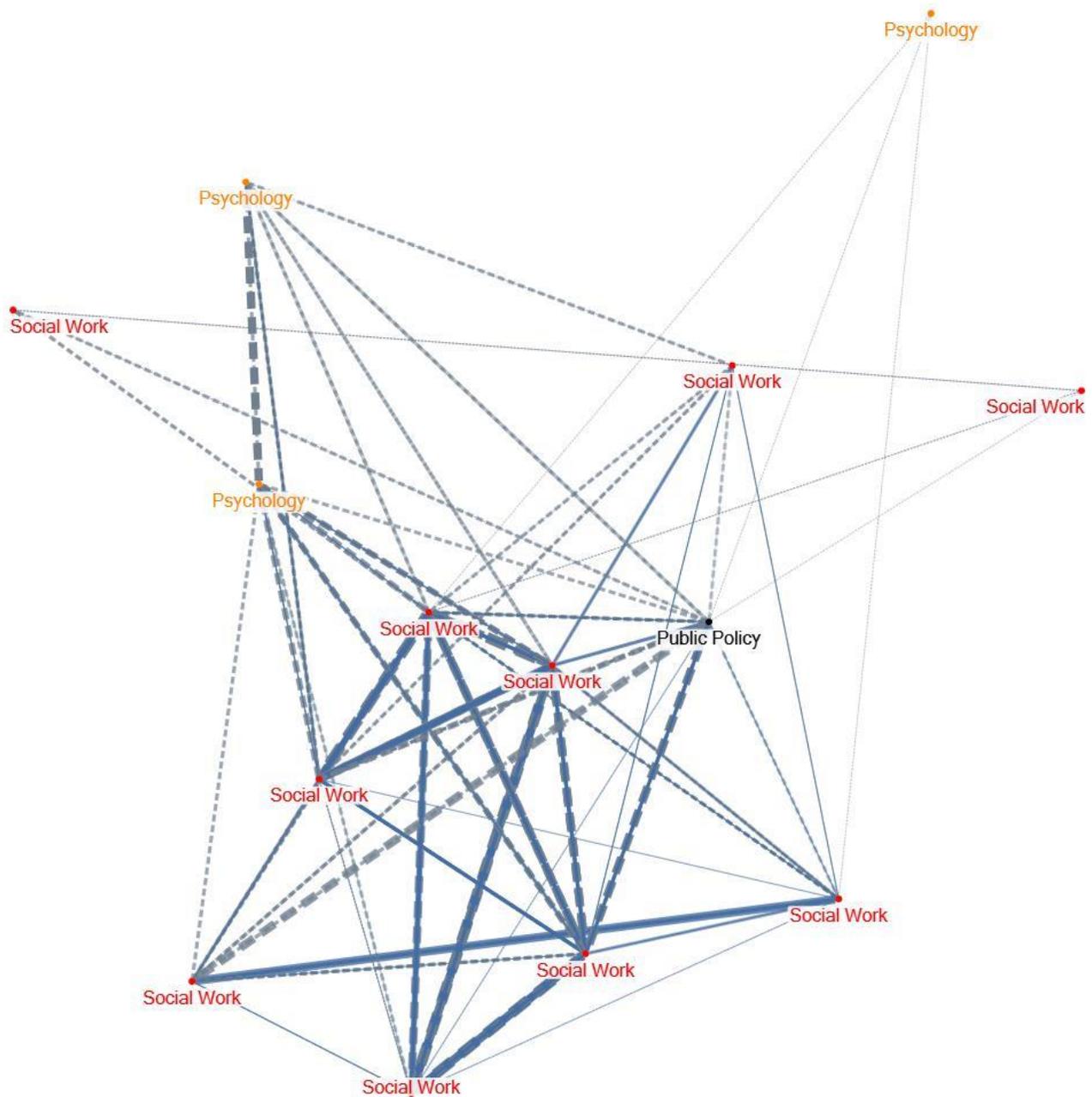
Figure 1. Cohort One Network: Small Group Affiliation



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Color indicates small group assignment.
- 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:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- One Cohort One fellow had no reported interactions with any other Cohort One fellow and is not represented in this graph.

Table 1. Cohort One Descriptive Statistics

Cohort One Fellow	Degree	Change from Prior Year	Betweenness Centrality
Fellow 111	13	0	14.410
Fellow 113	13	3	14.410
Fellow 106	9	3	2.333
Fellow 101	10	1	1.410
Fellow 105	10	1	1.410
Fellow 110	9	-2	0.643
Fellow 109	8	-1	0.567
Fellow 108	7	4	0.367
Fellow 104	6	-5	0.167
Fellow 112	8	1	0.143
Fellow 107	8	0	0.143
Fellow 103	3	-2	0.000
Fellow 102	3	-1	0.000
Fellow 114	3	-4	0.000
Fellow 115	0	0	0.000
		Prior Year	
Network Average	7.9	8.1	
Network Median	8.0	9.0	

Notes:

- Table 1 includes all 15 fellows from Cohort One, including the one that dropped from the network this year.
- *Degree*: Number of connections attached to that fellow.
- *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 fellowships in 2014. Cohort Two had 12 active fellows, who exhibited a graph density of 30% and an average degree of 3.3 direct connections (described in more detail below). Within this cohort, three members did not engage with any other Cohort Two fellow and dropped from this network, a pattern consistent with last year's survey. Figure 3 documents the interactions among the remaining 12 Cohort Two fellows, with the fellows' unique identifier 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 social work programs (red). Of the remaining fellows, three were in a psychology field (orange), one was in sociology (blue), and one was in public health (green).²

Description of the Network

Cohort Two had a graph density of 0.30, meaning that 30% of possible edges (i.e., connections) between fellows occurred. This is the lowest among all cohorts and a slight decrease from last year's 36%. These fellows have been out of the program for four years and have consistently demonstrated weaker connections than other cohorts. Like last year, three Cohort Two fellows reported no interactions with others in their cohort during the reporting period (including two fellows for the third 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 3.3, indicating that, on average, a Cohort Two fellow interacted with less than one-quarter of their cohort.³ 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 with Fellows 213, 212, and 210. These fellows had connections to the core, middle, and periphery of the network—notably, as the only connection to other fellows—and they have the highest betweenness centrality scores. The core of the network was very clearly Fellow 213. This fellow was the only fellow to interact with more than half of their cohort's peers (8) and had the highest betweenness centrality (24), reflecting the central role the fellow played in sustaining the network. While connections between cohort members are fewer, the quality of these connections are rated fairly high. Among all reported Cohort Two connections with quality ratings (95.8% of connections), 71.7% were rated high quality.

² Two fellows that dropped from the network were in social work programs; the third was in a psychology program. These three fellows are not represented in Figures 3 and 4.

³ The average degree for all 15 fellows is 2.7. The 3 nonactive fellows bring down the average by less than one degree, meaning, on average, each fellow in the network is interacting with even fewer fellows when all 15 fellows are included.

Small Group Affiliation

The impacts of small group connections are fairly negligible in this cohort, as seen in Figure 3. The small group structure is strongest among the purple group, home to two of the most active fellows (Fellow 213 and Fellow 210) of the cohort. This group has a graph density of 0.6, meaning 60% of possible connections between group members occurred. The other two groups had few to no connections—the group shown in blue had a 0.17 density while the group shown in red had no connections among its members. The red group only had three active group members, while the blue group had four. Three of the four active members of the group shown in blue have betweenness centrality ratings of 0.0, meaning they are peripheral members and at risk of dropping out of the network. It is apparent that small groups are not a driving force behind many connections taking place for Cohort Two fellows.

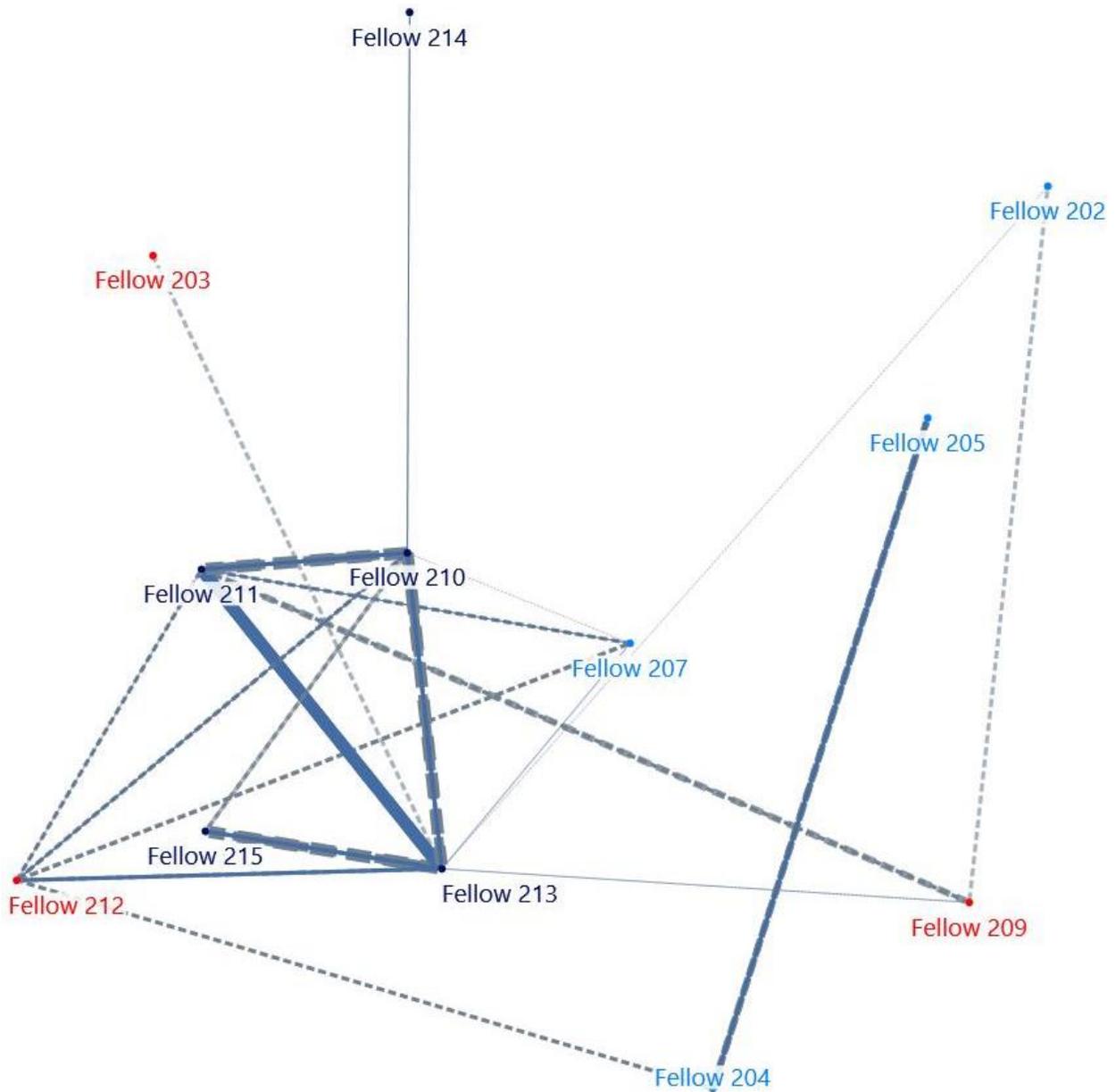
Disciplines

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 (58.3%) and, in both networks, social work fellows formed the core of the network. Among all Cohort Two within-cohort connections, 27.1% were interdisciplinary. In Cohort Two, the social work fellows, shown in red, were somewhat clustered in a group and had a strong graph density of 0.62, very similar to their graph density from the previous year (0.67). However, unlike Cohort One, the Cohort Two fellows in the psychology field did not have any interactions with one another during the reporting period. For a second year in a row, they had a graph density of 0.0. The fellows from health care-related fields also had a graph density of 0.0. 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, through the strength of the social work fellows' connections.

Retention

Similar to last year, a total of three fellows from Cohort Two dropped from their cohort network. Thus, only 80% of the fellows were in contact with each other. Once again, this cohort also had 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% (see Table 2). This is the lowest retention rate of all of the seven cohorts included in this analysis. This pattern is consistent with the level of activity reported in prior years, although three fellows reported a greater number of contacts with other Cohort Two fellows this year in contrast to last year. Cohort Two's cohesiveness has consistently been weakest among all cohorts in the fellowships network.

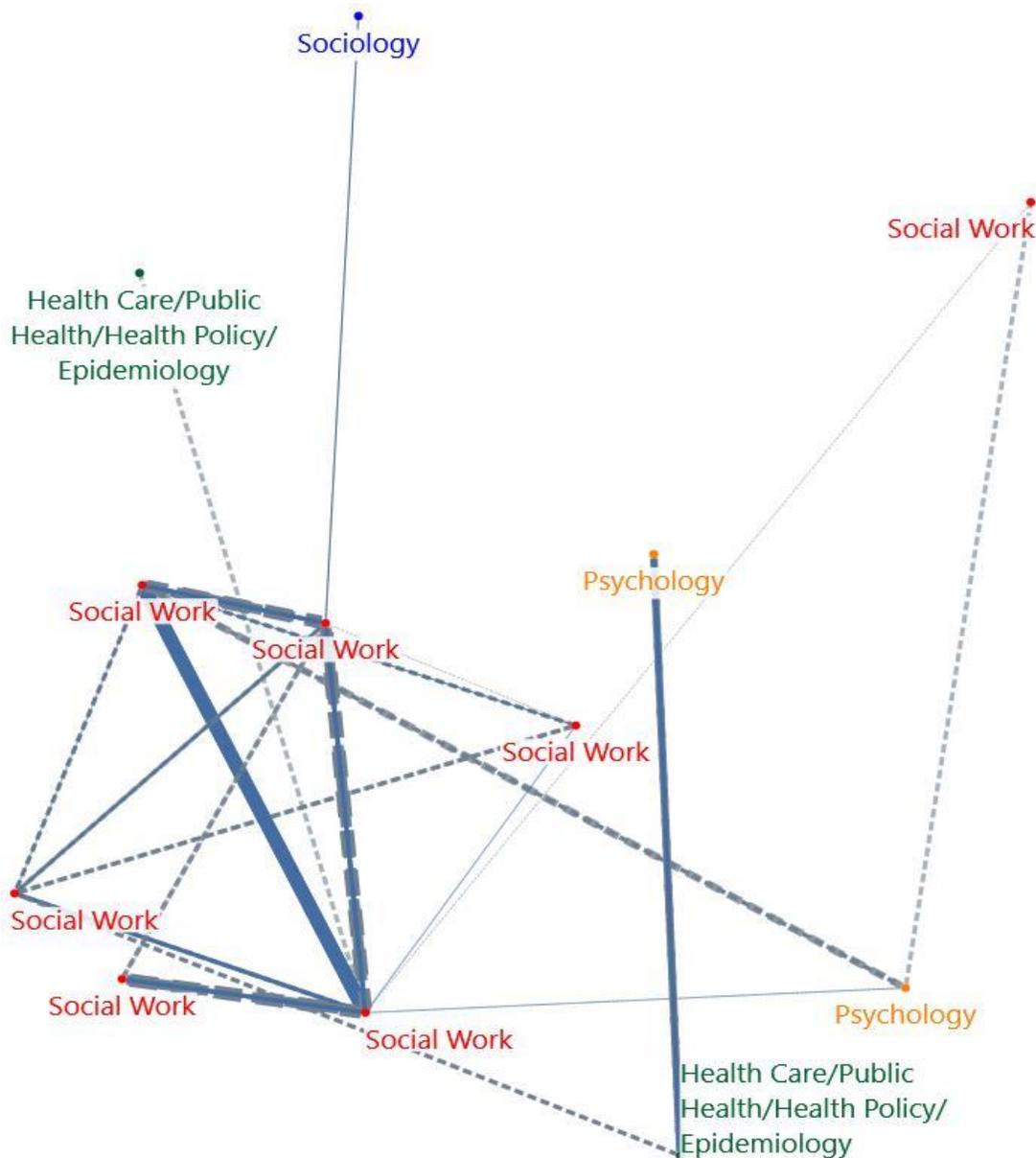
Figure 3. Cohort Two Network: Small Group Affiliation



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Color indicates small group assignment.
- Three Cohort Two fellows had no reported interactions with any other Cohort Two fellow and are not represented in this graph.

Figure 4. Cohort Two Network: Academic Discipline



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Three Cohort Two fellows had no reported interactions with any other Cohort Two fellow and are not represented in this graph.

Table 2. Cohort Two Descriptive Statistics

Cohort Two Fellow	Degree	Change from Prior Year	Betweenness Centrality
Fellow 213	8	3	24.000
Fellow 212	5	1	18.000
Fellow 210	6	-3	12.500
Fellow 204	2	-1	10.000
Fellow 211	5	-2	3.000
Fellow 209	3	0	0.500
Fellow 203	1	1	0.000
Fellow 207	4	-2	0.000
Fellow 202	2	-1	0.000
Fellow 215	2	-2	0.000
Fellow 214	1	0	0.000
Fellow 204	1	-2	0.000
Fellow 206	0	-1	0.000
Fellow 201	0	0	0.000
Fellow 208	0	0	0.000
		Prior Year	
Network Average	3.3	4	
Network Median	2.5	3.5	

Notes:

- Table 2 includes all 15 fellows from Cohort Two, including the three that dropped from the network this year.
- *Degree*: Number of connections attached to that fellow.
- *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 fellowships in 2015. Cohort Three had 15 active fellows, who exhibited a graph density of 48% with an average degree of 6.7 direct connections (described in more detail below). Figure 5 documents the interactions among the 15 Cohort Three fellows, with the fellows' unique identifier color-coded to reflect their small group assignment and initial research interests. For this cohort, the fellows were assigned to 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 on 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 (purple); two were in psychology (orange); two were in the health care/public health field (green); and one was in social policy (black).

Description of the Network

Cohort Three had a graph density of 0.48, meaning that 48% of possible edges (i.e., connections) between fellows occurred. This was a decrease in density over last year, when the cohort reported a graph density of 0.54. Overall, the number of within-cohort connections for Cohort Three declined this year. As shown in Table 3, Cohort Three had an average degree of 6.7, meaning that, on average, a fellow in Cohort Three interacted with slightly less than half of their cohort peers during the reporting period. This is more than double the average of Cohort Two, but less than Cohort One's network average degree.

One fellow forms a clear epicenter of the cohort, and reported high-quality and frequent interactions with the majority of her cohort peers. This is shown in Figure 5, with wider lines from Fellow 310 (indicating a high number of interactions) and darker lines (indicating high-quality interactions) than most lines in the figure. As Table 3 shows, this fellow connected with nearly everyone in the cohort and has a betweenness centrality rating of nearly 24, indicating the fellow's critical role in keeping some periphery fellows engaged in the network. Among all reported Cohort Three connections with quality ratings (82.5% of connections), 60.0% were rated high quality.

Small Group Affiliation

In this cohort network, small group affiliations affect the network's structure. The cluster of fellows in purple in Figure 5 show the strong connections from this small group, which also had a graph density of 1.0, meaning that every member of the group was connected to each other member. The members of the blue group had a graph density of 0.8; however, the lines connecting them to each other on the whole appear less frequently (indicated by thinner lines)

than their interactions with other cohort peers. The members of the red group appear mostly on the periphery of the figure, and this group's graph density lies at 0.5.

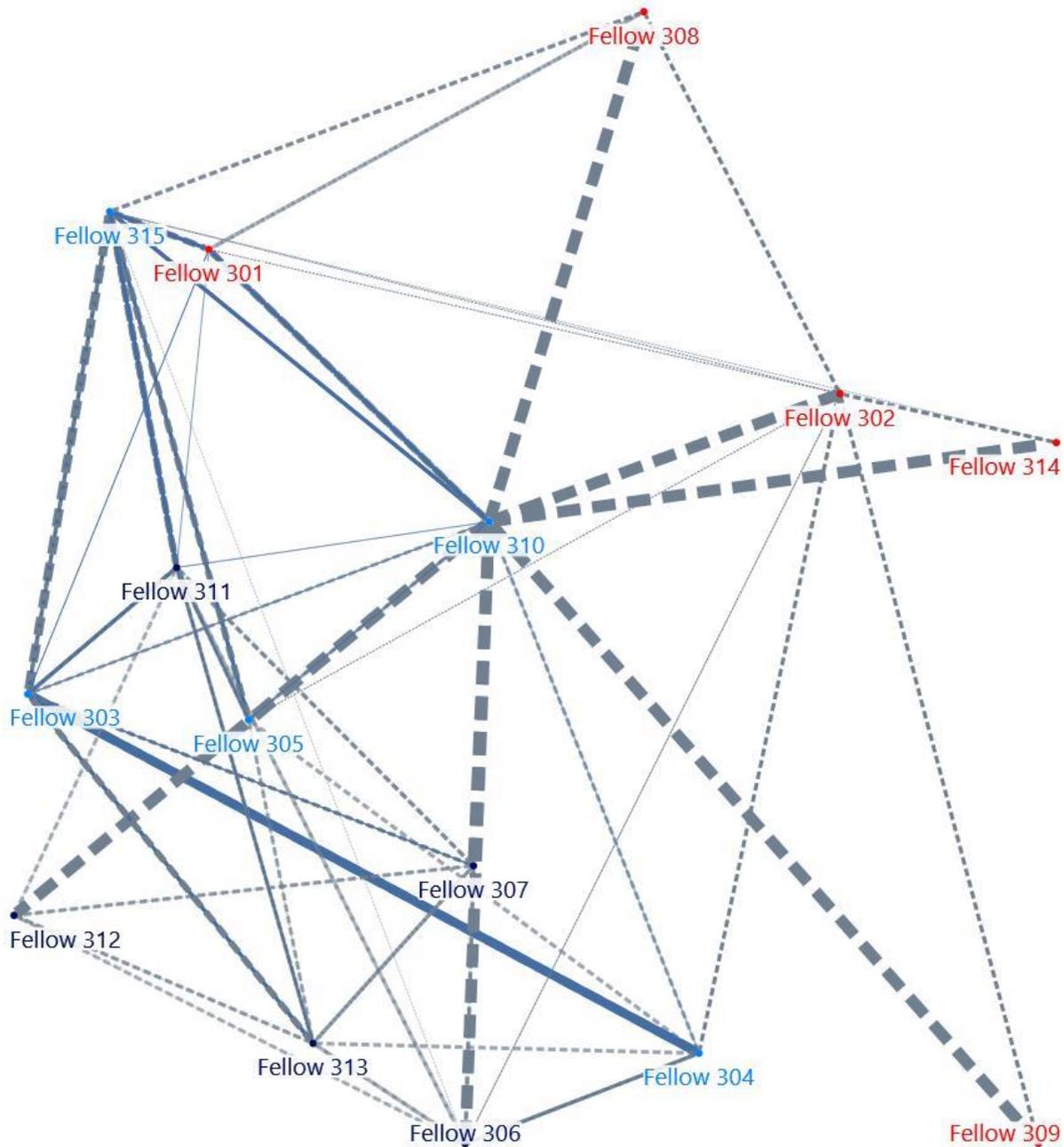
Disciplines

Cohort Three began a trend toward 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. Reflecting this shift, 56.3% of all Cohort Three within-cohort connections were interdisciplinary (compared to 38.5% and 27.1% for Cohorts One and Two, respectively). Nonetheless, fellows within three of the discipline groups within this cohort reported strong connections to each other. The six social work Cohort Three fellows maintain strong connections, and had a graph density of 0.8, as shown in Figure 6.

Retention

Among the Cohort Three fellows, 7 out of the 15 fellows connected with more than six other fellows in their cohort, putting the retention rate for this cohort at 47%. While still strong, this retention rate is significantly below last year, when 67% of this group reported interactions with half of their Cohort Three colleagues. Nearly every fellow reported contacting with as many or fewer of their Cohort Three peers this year compared to last. This lower within-cohort connectedness does not imply Cohort Three fellows did not gain as much from the network this past year. It is possible that the fellows sought connections outside of their cohort. Analysis in the full fellowships section will highlight their overall connections with the network. Results from next year's survey will be analyzed to see if this trend continues. If it does, we can explore potential explanations.

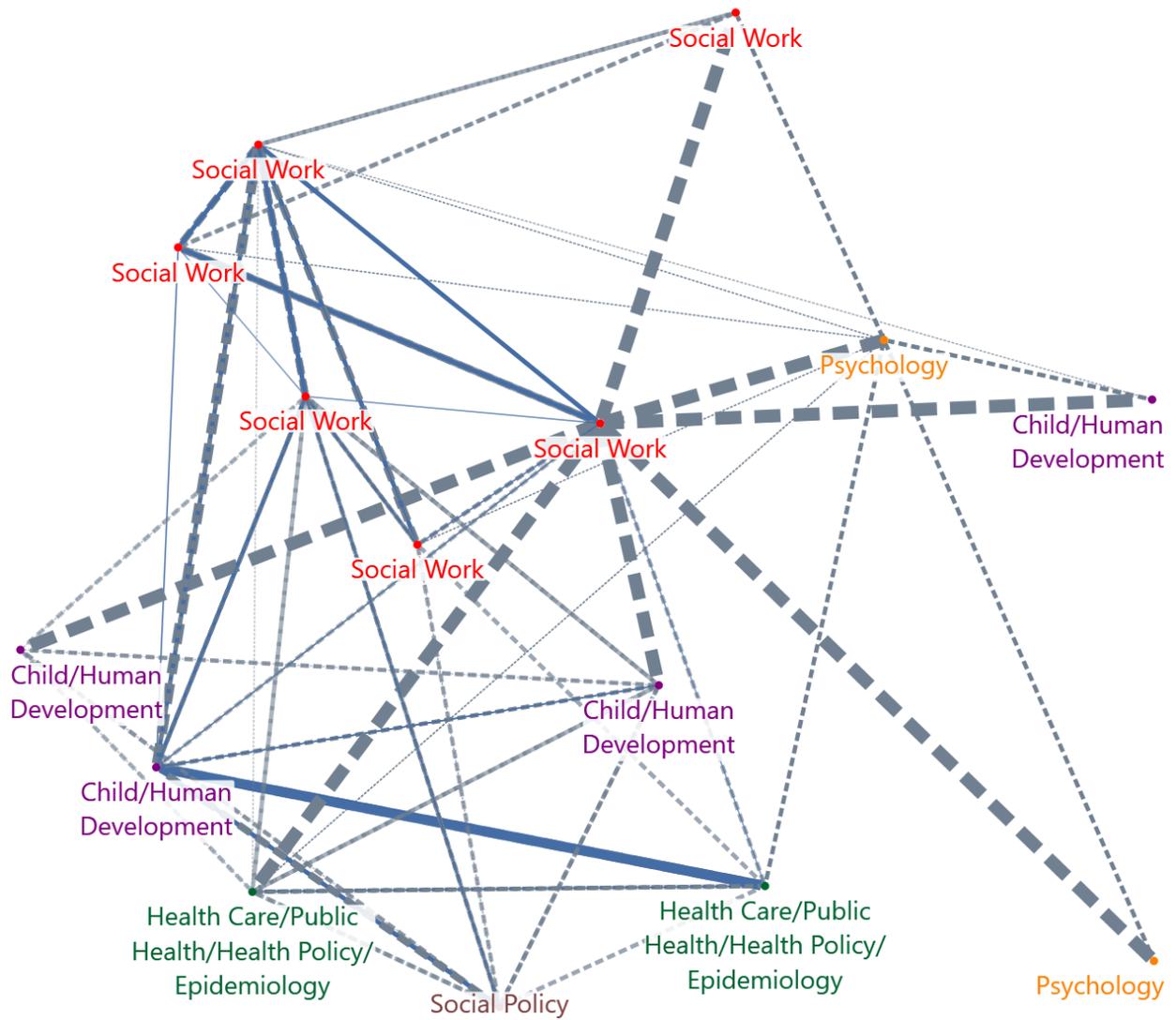
Figure 5. Cohort Three Network: Small Group Affiliation



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Color indicates small group assignment.

Figure 6. Cohort Three Network: Academic Discipline



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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
Fellow 310	13	4	23.938
Fellow 302	9	0	8.402
Fellow 315	9	-1	5.686
Fellow 311	9	-3	4.690
Fellow 306	8	-2	4.095
Fellow 303	7	-3	2.890
Fellow 313	7	-3	2.233
Fellow 305	6	-2	1.928
Fellow 304	6	-2	1.727
Fellow 301	6	2	1.242
Fellow 307	6	0	0.793
Fellow 312	5	0	0.377
Fellow 314	3	0	0.000
Fellow 308	4	-4	0.000
Fellow 309	2	0	0.000
		Prior Year	
Network Average	6.7	7.6	
Network Median	6.0	8	

Notes:

- *Degree*: Number of connections attached to that fellow.
- *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 fellowships in 2016. Cohort Four had 15 active fellows, who exhibited a high graph density (50%) and an average degree of 6.9 direct connections (described in more detail below). Figure 7 documents the interactions among the 15 Cohort Four fellows, with the fellows' unique identifier 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 interdisciplinary. Other disciplines represented in the cohort include: two fellows in clinical psychology, shown in orange; two fellows in education, shown in yellow; and one fellow each in sociology (blue), criminal justice (pink), social policy (brown), health care/public health (green), and child/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 the same graph density for this cohort as the previous year. While all fellows responded to the survey and were active in this network, one Cohort Four fellow did not indicate they had any connections with another Cohort Four fellow. They apparently remained active, however, because one of their Cohort Four peers said they connected with them at some point during the year. Three other fellows noted only one or two connections with a peer from their cohort during the year. As reported in Table 4, Cohort Four had an average degree of 6.9, meaning that, on average, a fellow in Cohort Four interacted with about one half of their cohort peers during the reporting period.

A core group of three fellows (Fellows 403, 404, and 415) in this cohort had the highest betweenness centrality scores and connected with more than half of their cohort peers. These fellows were not only among the most active but were most critical to keeping the cohort engaged, reaching out to the fellows who did not indicate any or many interactions on their own. Fellows enrolled in social work programs comprised this core group. This is somewhat surprising given the interdisciplinary nature of the cohort. However, even though their graph density places them in the middle of the fellowships cohorts, and all fellows were active in the cohort, the fellows from Cohort Four did not rate their interactions with each other very highly. Among all reported Cohort Four connections with quality ratings (75.8% of connections), only 17.9% were rated high quality. This is evident by the light lines in Figures 7 and 8, compared to the lines displayed in other cohorts' graphs.

Small Group Affiliation

In the Cohort Four network, small groups played an obvious role in the network's structure (see Figure 7). One of the small groups, shown in purple in Figure 7, 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, making 90% of possible connections. This group hosted a few more peripheral members of the network as a whole. However, it was also home to the fellow with the highest centrality (Fellow 415), 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 third group, shown in blue, also had strong graph density of 0.8.

For the second year in a row, the strength of these small group connections played an integral role in defining the fellowships experience for the Cohort Four fellows. Cohort Four fellows have been out of the fellowships for two years during the sample period, and while the quality of interactions were rated lower, on average, than any other cohort, 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.

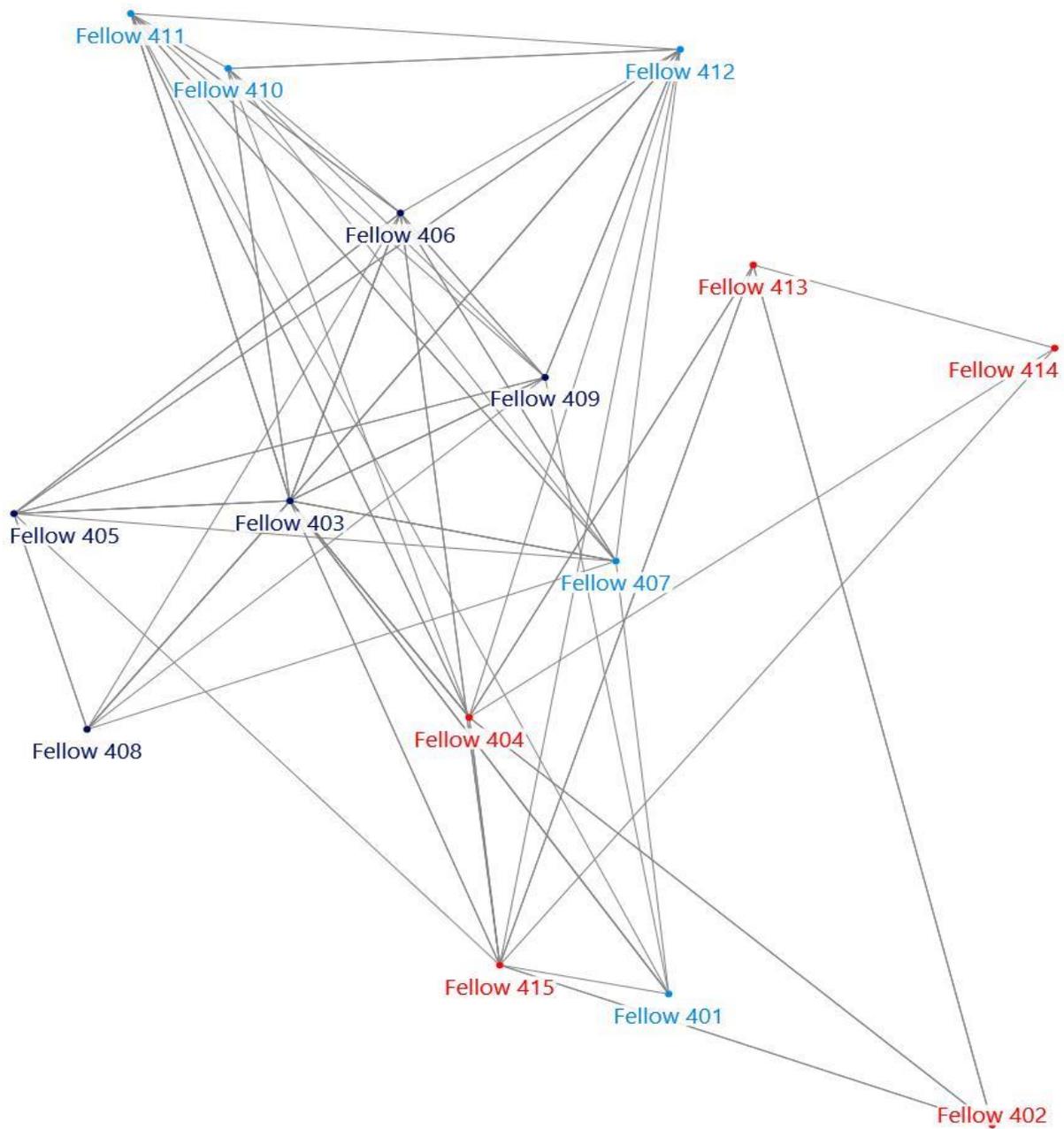
Disciplines

Cohort Four membership reflects the fellowships' 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. Reflecting this fact, 75.8% of all Cohort Four within-cohort connections were interdisciplinary, among the highest across all cohorts in the network. However, when we look within disciplinary groups in Cohort Four, the fellows in social work exhibited a graph density of 0.60, 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, ten of the 15 connected with more than six of the other fellows in their network, increasing the cohort's retention rate to 67% from the 47% reported last year. Only five of the fellows reported fewer interactions with others in their cohort this year than in last year's survey. Given the consistency in fellow's degrees, as shown in Table 4, and in the cohort's graph density, this cohort may have found their equilibrium of connections. Analysis for next year's survey will help confirm this hypothesis, and given other data, efforts aimed at this cohort should be directed towards improving the quality of the connections, rather than the number of connections.

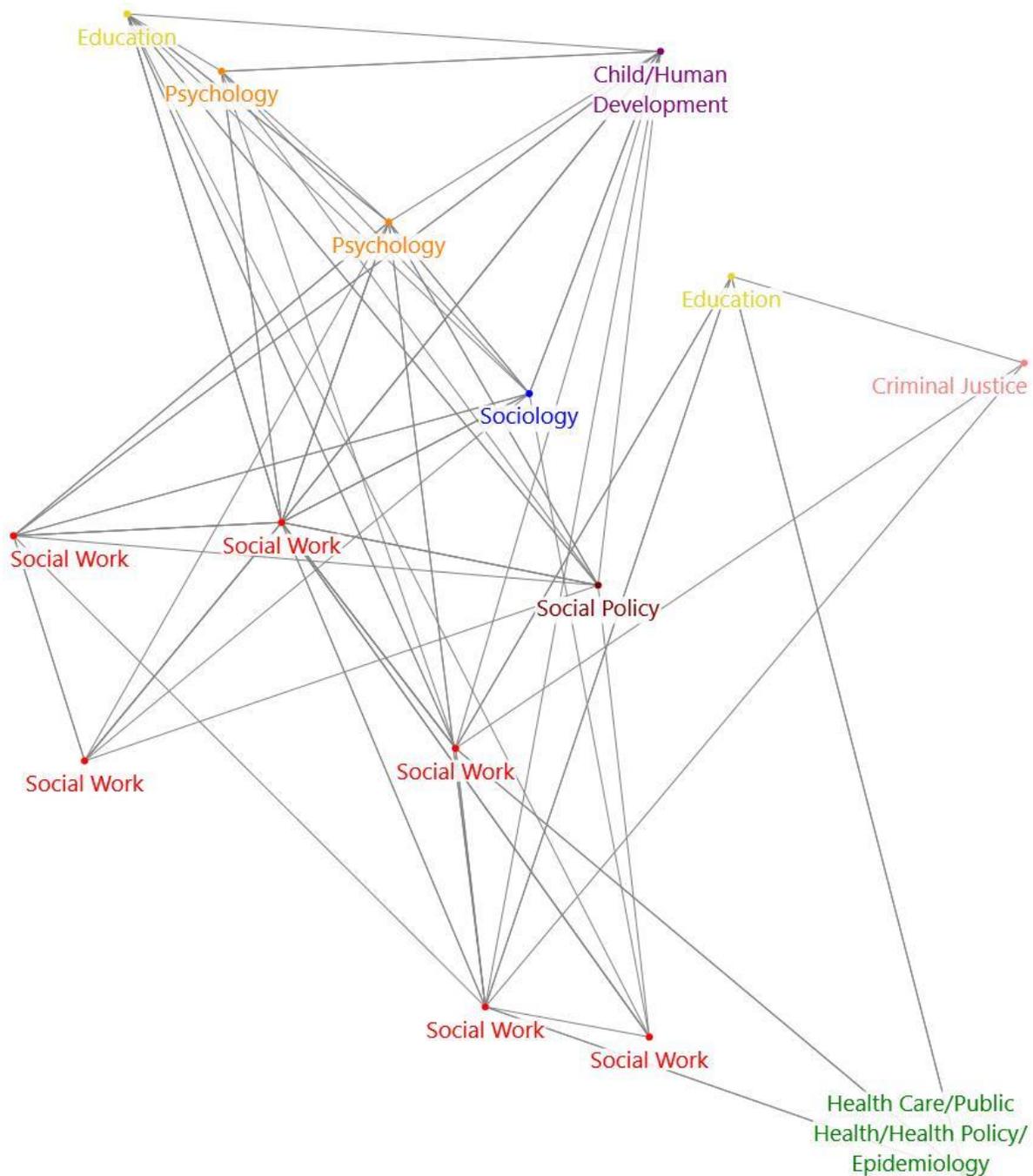
Figure 7. Cohort Four Network: Small Group Affiliation



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Color indicates small group assignment.

Figure 8. Cohort Four Network: Academic Discipline



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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
Fellow 415	9	0	19.433
Fellow 404	8	2	13.200
Fellow 403	11	1	8.842
Fellow 406	9	-1	3.825
Fellow 412	9	-1	3.742
Fellow 405	7	0	2.475
Fellow 411	8	0	2.475
Fellow 409	8	2	2.333
Fellow 407	8	-3	2.333
Fellow 410	7	1	1.492
Fellow 401	5	0	1.392
Fellow 413	4	-1	0.333
Fellow 408	5	0	0.125
Fellow 414	3	0	0.000
Fellow 402	3	-2	0.000
		Prior Year	
Network Average	6.9	6.7	
Network Median	8.0	6.0	

Notes:

- *Degree*: Number of connections attached to that fellow.
- *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 fellowships in 2017. Cohort Five had 15 active fellows, who exhibited a graph density of 39% and had an average degree of 5.5 connections (described in more detail below). 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 (red), two fellows were enrolled in child/human development (purple), two fellows were enrolled in health care/public health/health policy/epidemiology (green), and one fellow was enrolled in sociology (blue).

Description of the Network

Cohort Five had a graph density of 0.39, meaning that 39% of possible edges (i.e., connections) between fellows occurred. This was a decrease from the prior year, when Cohort Five had a graph density of 0.55, and mirrors the density from their first year in the fellowships. Cohort Five's average degree of connection (5.5 direct connections) also mirrors that of two years ago, and is also a decline from the previous year (7.7). No single fellow connected with more of their Cohort Five peers this year compared to last—two had no change while 13 fellows connected with fewer fellows compared to the year prior.

Figure 9 shows that there is a clear distinction between the peripheral members of the network (Fellows 501, 503, and 507)—these three connected with only one or two of their peers during the year and have a 0.0 betweenness centrality score. Conversely, there is a solid core of five Fellows in the middle of the graph. These five report the highest number of degrees in the cohort, and claim the highest betweenness centrality scores of the network. This dichotomy between the fellows in the network results in averages that trend toward the middle degree, density, and quality scores. Along these lines, among all reported Cohort Five connections with quality ratings (95.2% of connections), nearly half (49%) were rated high quality.

Small Group Affiliation

In the Cohort Five network, small groups played an obvious role in the structure of the overall network. The red and blue groups had strong graph densities of 1.0, meaning 100% of possible connections occurred between the five group members in each group. On the other hand, the small group shown in purple only had a graph density of 0.30, a significant decrease from last

year's density of 0.80. Not surprisingly, the small group shown in purple is home to the three clear peripheral network members previously discussed.

Disciplines

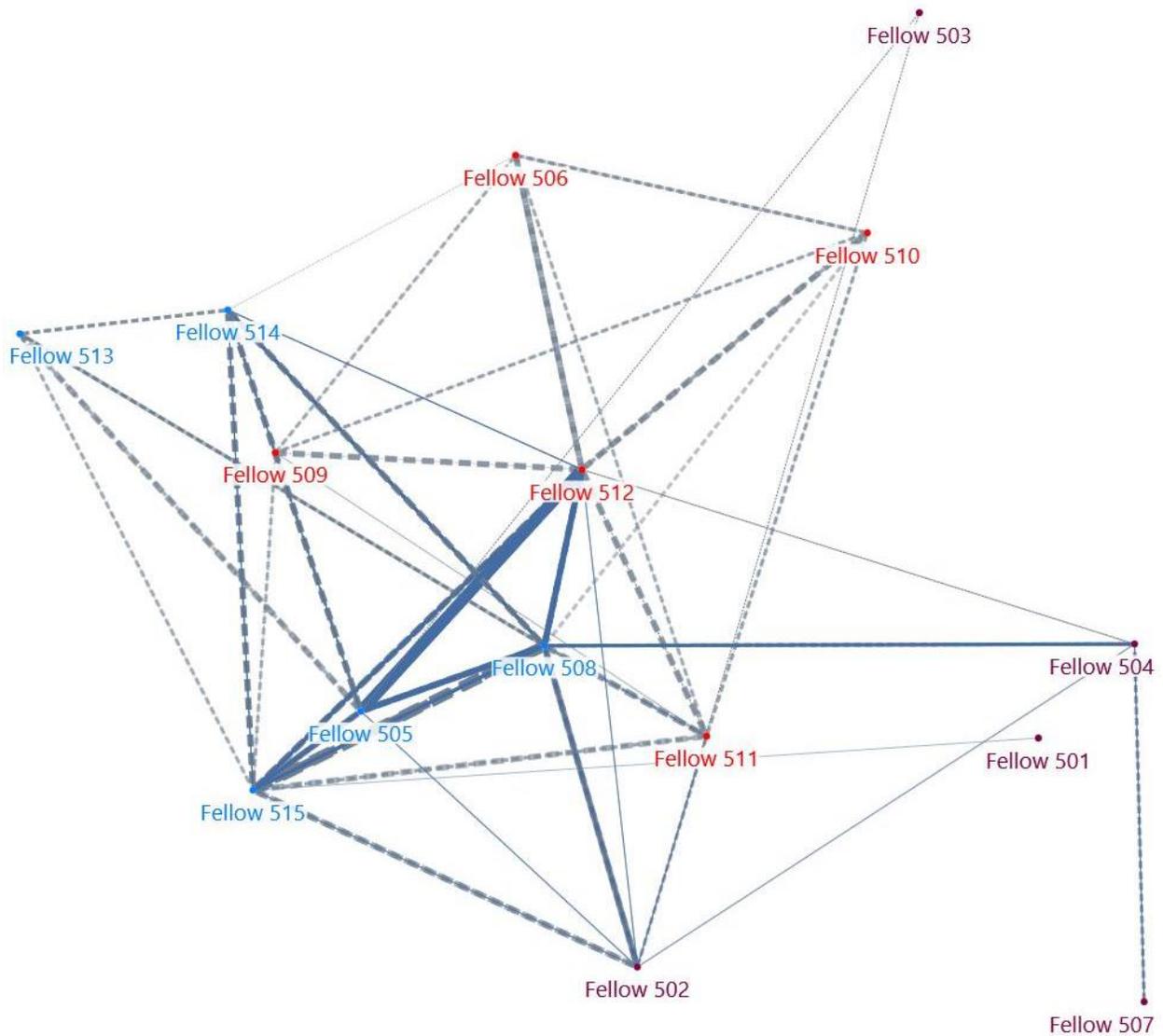
Cohort Five is a disciplinarily diverse cohort with less than one-third of the fellows (four) in social work. In this cohort, discipline played a small role in the network structure, similar to the pattern observed in Cohort Four, as seen in Figure 10. Among all within-cohort connections in Cohort Five, 65.7% were interdisciplinary. Within Cohort Five, the fellows in social work exhibited a graph density of 0.8, despite being spread across small groups. However, the fellows in psychology, who comprise the majority of Cohort Five, had a weak graph density of 0.30. This was a significant decrease from the discipline's density last year (0.67). Cohort Five fellows are clearly connecting across discipline boundaries.

Retention

Among the Cohort Five fellows, only six of the 15 connected with more than six of the other fellows in their network, putting the retention rate for this cohort at 40%, a significant drop from the levels of interaction last year (67%). Like Cohort Four, all but two fellows decreased their degree (i.e., number of other fellows they connected with) from the prior year, and those other two maintained contact with the same number of cohort peers, as shown in Table 5. This decrease in the total number of connections and number of cohort peers with whom a fellow interacts with is similar to the patterns we have observed in other cohorts in the year after they graduate from the program. This year is a time of significant change for the fellows as they work on publishing their dissertation and establishing themselves in a new job. As fellows move forward in their careers, within-cohort interactions are replaced by a broader involvement with fellows in other cohorts. These findings were consistent with the behavior of Cohort Four the previous year and Cohort Three the year prior to that, during their first years out of the fellowships. Reflecting this shift, Cohort Five fellows reported high levels of engagement with fellows outside of their cohort, indicating they remain active and find value in the broader Fellowships network.⁴

⁴ For example, two-thirds of the Cohort Five fellows attended the April 2019 Mid-Year Meeting in Arizona, demonstrating the active engagement of this cohort and reinforcing the fact that a cohort may show lower within-cohort strength while still being very active and contributing participants in the larger network.

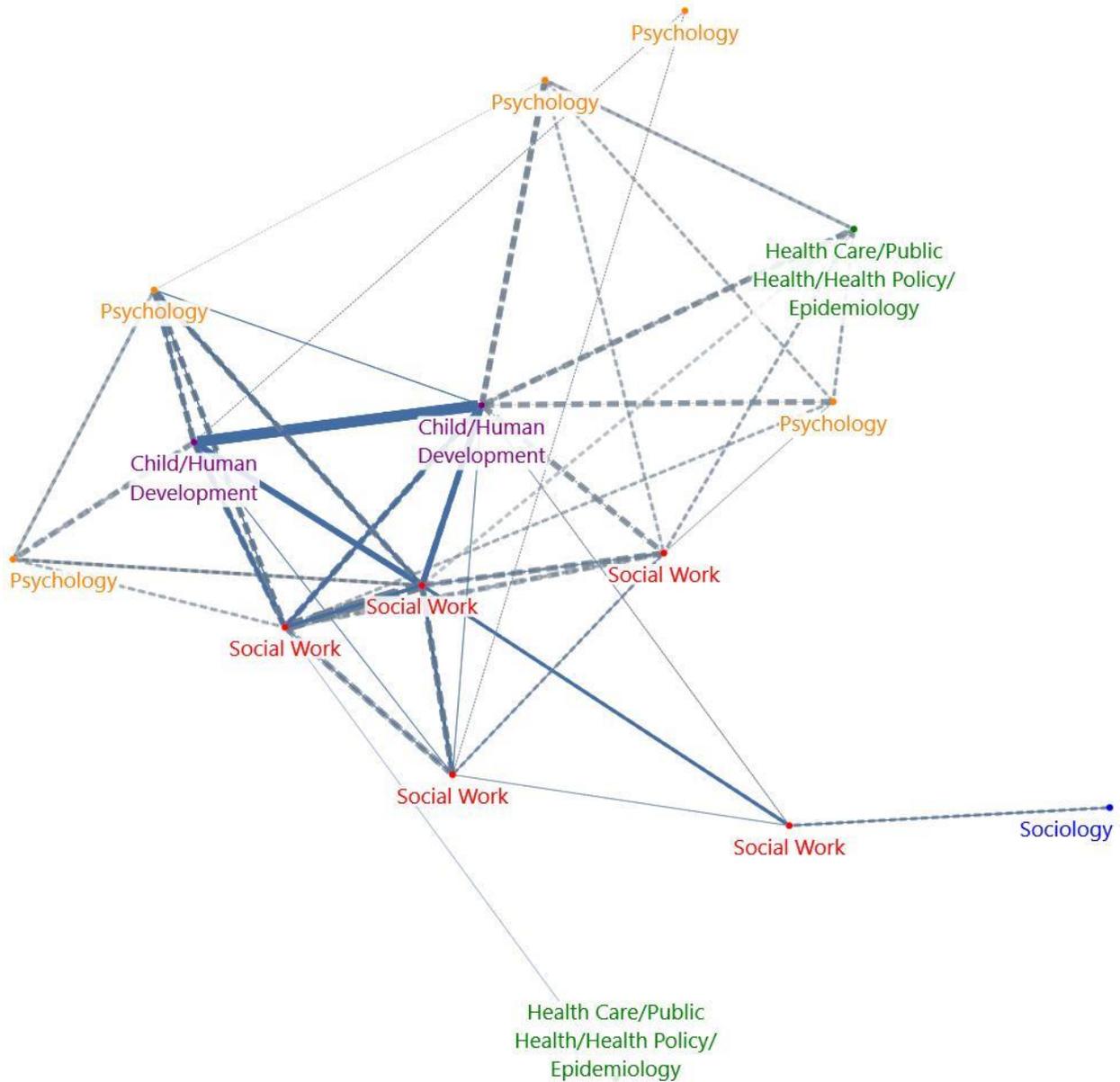
Figure 9. Cohort Five Network: Small Group Affiliation



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Color indicates small group assignment.

Figure 10. Cohort Five Network: Academic Discipline



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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
Fellow 515	9	-2	17.650
Fellow 512	10	-2	15.550
Fellow 504	4	-3	13.000
Fellow 508	9	-2	11.567
Fellow 502	7	0	9.617
Fellow 505	7	-1	6.133
Fellow 511	7	-3	3.317
Fellow 514	6	-2	2.750
Fellow 509	5	-2	1.000
Fellow 506	5	-1	0.917
Fellow 510	5	0	0.500
Fellow 507	1	-3	0.000
Fellow 503	2	-4	0.000
Fellow 501	1	-7	0.000
Fellow 513	4	-6	0.000
		Prior Year	
Network Average	5.5	6.7	
Network Median	5.0	6.0	

Notes:

- *Degree*: Number of connections attached to that fellow.
- *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 graduated from the fellowships in 2018. Cohort Six had 15 active fellows, who exhibited a high graph density of 68% and an average degree of 9.5 direct connections (described in more detail below). Figure 11 documents the interactions among the 15 Cohort Six fellows, with the fellows' unique identifier color coded to reflect their small group assignment. For this cohort, small groups were 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 (red). The remaining fellows cover a range of disciplines, including six fellows in psychology (orange), two fellows in sociology (blue), two fellows in public policy (black), one fellow in health care/public health (green,) and one fellow in social policy (brown).

Description of the Network

Cohort Six had a graph density of 0.68, meaning that over two-thirds (68%) of all possible connections between Cohort Six fellows occurred outside of mandatory fellowships functions. This was a significant increase from the prior year, when Cohort Six had a graph density of 0.48. Cohort Six became a more highly connected group during their final year in the fellowships. Cohort Six had an average degree of connection of 9.5, meaning that, on average, a Cohort Six fellow connected with two-thirds of their cohort peers during the survey year. This was a significant increase from last year (6.7).

Reflecting this increased connectedness, only two fellows reported connecting with fewer cohort peers this past year than the year prior. Nearly all (11) connected with more fellows, and some increased the number of their peers they connected with significantly, with Fellow 614 connecting with 8 more fellows and Fellow 613 connecting with 9 more fellows compared to the previous year. Additionally, two fellows reported connections with all 14 of their peers. Because of this well-connected group, betweenness centrality scores are more moderate and narrow in range, shown in Table 6. No one fellow played a critical role in keeping another connected because the group overall was well connected. In addition to a high number of connections, there were some high-quality connections occurring, as indicated by the dark lines in Figure 11. Among all reported Cohort Six connections with quality ratings (95.1% of connections), 64% were rated high quality. This is the second highest overall quality rating of within-cohort connections among all seven cohorts in the sample.

Small Group Affiliation

In the Cohort Six network, small groups played a role in the structure of the overall network, as evident by the connections maintained between small group members. The small group shown in purple 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 0.9 and the red group reporting a graph density of 0.8. This is notable because the survey asks fellows to omit interactions made in order to work on their small group projects. While all groups have strong densities, Figure 11 shows that the strong and frequent connections (shown by wide, dark lines) do not remain only within the small group boundaries. There are instances of strong connections within groups; for example, the connections between both Fellow 613 (red group) and Fellow 614 (purple) with *all* of their group members appear frequent and strong. Overall, however, the cohort seems to create interactions and collaborations across small groups in addition to strong connections within their groups.

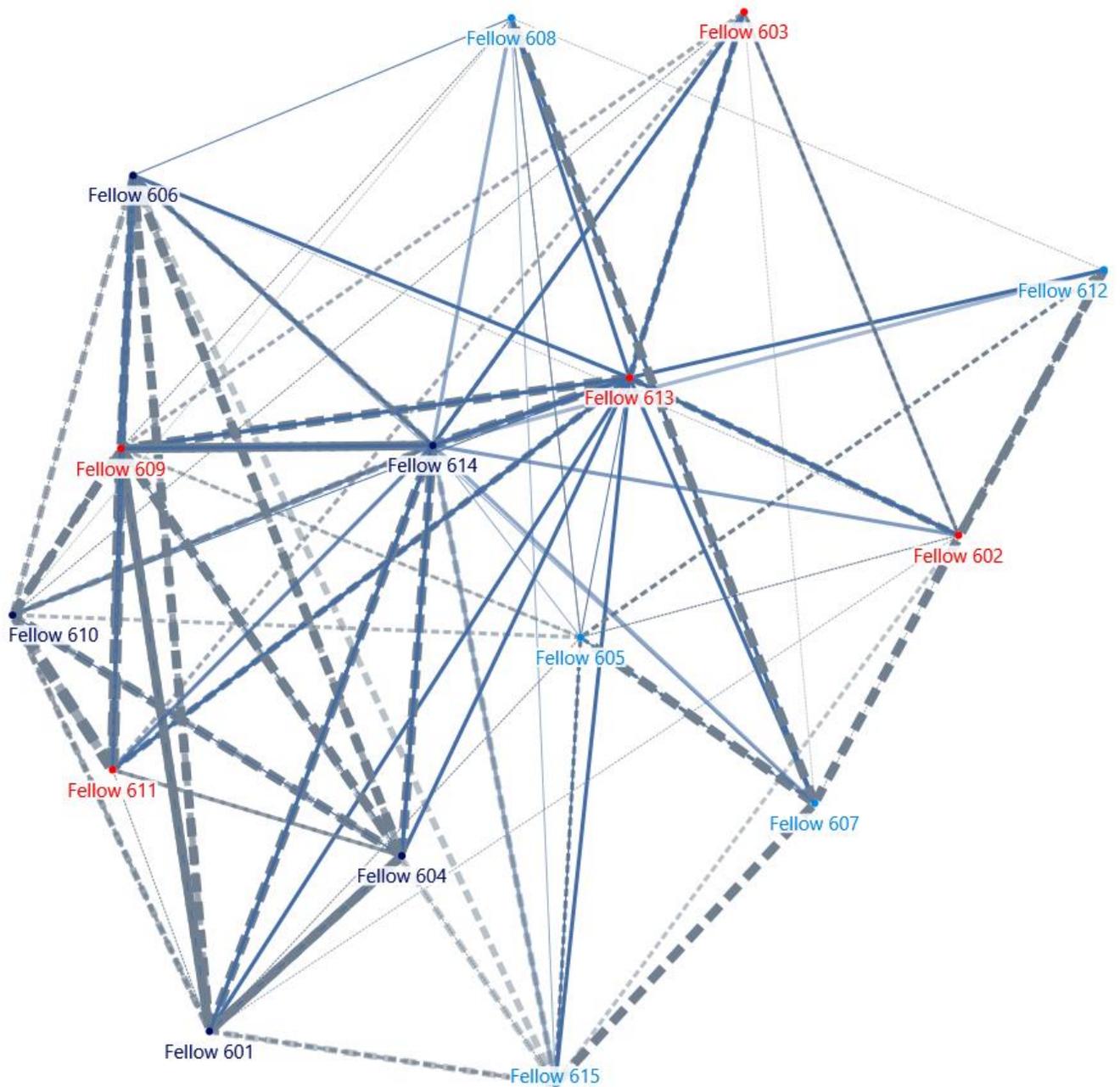
Disciplines

Cohort Six has a diverse group of academic 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. Discipline does play more of a role in shaping the structure of the network, as shown in Figure 12. All four disciplines have more than one fellow exhibiting a graph density of 1.0, meaning they all connected with every other fellow in their discipline in the cohort. As seen in the overall network structure in Figure 12, the psychology fellows (shown in orange) are clustered together and showed mostly strong and frequent connections, as evident by the dark, wide lines connecting those fellows. It also appears that the fellow in health care established a strong connection with the psychology and social work fellows. In addition, besides the strong connections within disciplines, the fellows in Cohort Six are reaching across disciplinary boundaries. Among all within-cohort connections in Cohort Six, 60.6% were interdisciplinary. This shows that while disciplines play a strong role in establishing connections, the fellows in Cohort Six also connect over other similarities, perhaps in approaches related to their dissertation work, career paths, and other shared interests.

Retention

Among the Cohort Six fellows, all but one connected with more than six of the other fellows in their network, putting the retention rate at 93%—the highest among all cohorts and the highest ever recorded in this survey. This is a significant jump from the previous year's retention rate (53%). This increase is not unexpected. It reflects the increased familiarity fellows have with their cohort peers and their openness to both seeking advice from other cohort members as well as offering assistance. Keeping in mind that these interactions do not include fellowship-sponsored events, such as annual and mid-year meetings or small group interactions, this level of connections is impressive and speaks to the value fellows place on the network. The fellows in Cohort Six have clearly established professional connections and friendships during their time in the fellowships network, growing more connected over the course of the two years, and will hopefully sustain these relationships as they move into their careers.

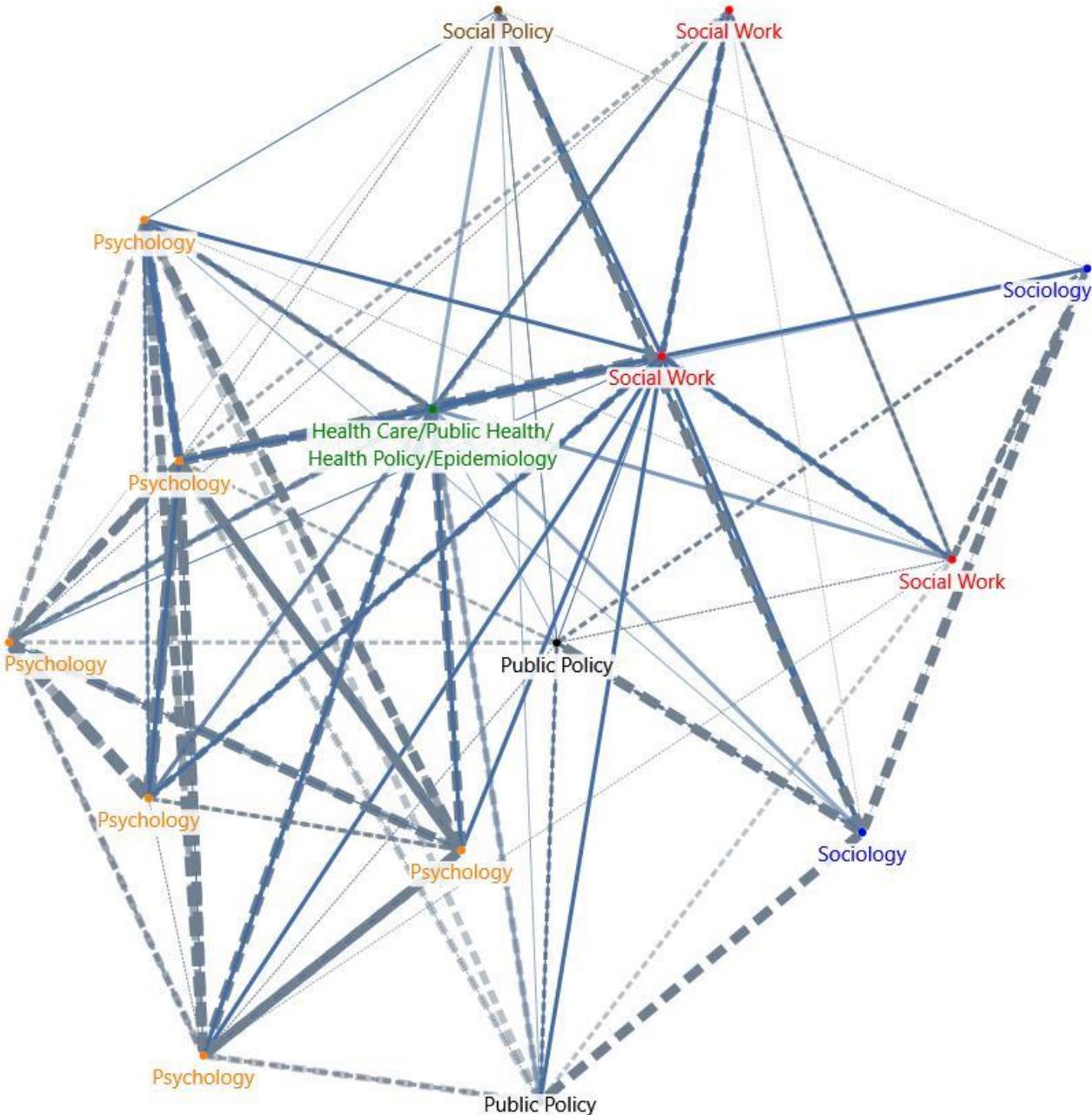
Figure 11. Cohort Six Network: Small Group Affiliation



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Color indicates small group assignment.

Figure 12. Cohort Six Network: Academic Discipline



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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	Change from Prior Year	Betweenness Centrality
Fellow 613	14	9	7.202
Fellow 614	14	8	7.202
Fellow 606	11	3	3.248
Fellow 609	11	-2	2.673
Fellow 605	10	3	2.331
Fellow 610	10	4	1.930
Fellow 601	10	2	1.813
Fellow 602	8	3	1.654
Fellow 607	8	3	1.437
Fellow 608	9	-2	1.430
Fellow 603	7	0	1.212
Fellow 615	9	2	1.049
Fellow 611	8	0	0.510
Fellow 612	6	1	0.310
Fellow 604	7	3	0.000
		Prior Year	
Network Average	9.5	6.7	
Network Median	9.0	7.0	

Notes:

- *Degree*: Number of connections attached to that fellow.
- *Betweenness*: How important each node/fellow is in providing a “bridge” between different parts of the network.

Cohort Seven

Cohort Seven was selected in 2017 and will graduate from the fellowships in 2019. Cohort Seven had 15 active fellows, who exhibited a high graph density of 56% and an average degree of 7.9 (described in more detail below). Figure 13 documents the interactions among the 15 Cohort Seven fellows, with the fellows' names color coded to reflect their small group assignment. For this cohort, small groups were formed around parenting stress and resilience, adverse childhood experiences and instruments to measure risk, and early childhood and the systems that serve them.

Figure 14 presents the same data with respect to interactions among the fellows but highlights each fellow's specific discipline. As noted in Figure 14, only two of the 15 fellows were enrolled in social work programs, shown in red. The remaining fellows cover a range of disciplines: four fellows in psychology (orange), four fellows in child/human development (purple), three fellows in health care/public health (green), and one fellow each in public policy (black) and social policy (brown).

Description of the Network

Cohort Seven had a graph density of 0.56, meaning that over half (56%) of all possible connections between Cohort Seven fellows occurred outside of mandatory fellowships functions. This graph density is one of the higher ones of all the cohorts, despite it being their first year of the fellowships and fellows just getting to know one another. This level of interaction outside the mandatory fellowships meetings and small group projects is slightly higher than what we observed in other cohorts at this same stage of their history with the program. In fact, this density level was 8 percentage points higher than what we observed for Cohort Six last year, and 17 percentage points higher than what we observed for Cohort Five two years ago.

The Cohort Seven network exhibited an average degree of 7.9, indicating that, on average, the Cohort Six fellows interacted with just over half of their cohort outside planned fellowships meetings and work on their small group projects. In this network, fellows with high degrees also exhibited higher betweenness centrality. There is a clear center of the network structure. Fellows in this center connected with each member of the cohort and had the highest betweenness centrality ranking by a wide margin (see Table 7). Figure 13 shows that Fellow 715 is at the core of this network, and because this Fellow made connections with every member of the network, this fellow is most instrumental to ensuring the sustained engagement of all fellows. Although there is a high number of connections for a new cohort, the reported quality of these connections was quite mixed. Among all reported Cohort Seven connections with quality ratings (99.2% of connections), 53.7% were rated high quality.

Small Group Affiliation

Within this cohort, early patterns of connections have been influenced by small group assignments, with fellows reporting more frequent interactions with the four other fellows in their small group than with others in their cohort. Again, these interactions occurred outside of meetings held to complete the mandatory small group project. The small groups shown in purple and blue had the strongest graph density, 1.0, meaning 100% of the connections that could be made between group members did occur. The red group also had a strong graph density of 0.9. The small groups do seem to influence the structure of the network—a handful of fellows only connected with all four members of their small group and one or two other fellows. Fellow 714, for example, connected with all four members of the blue group plus one other fellow, while Fellow 709 connected with all four members of the red group and only two additional fellows, as shown in Figure 13. The graph also shows that the connections between group members appear frequent and of high quality, as indicated by wide and dark lines.

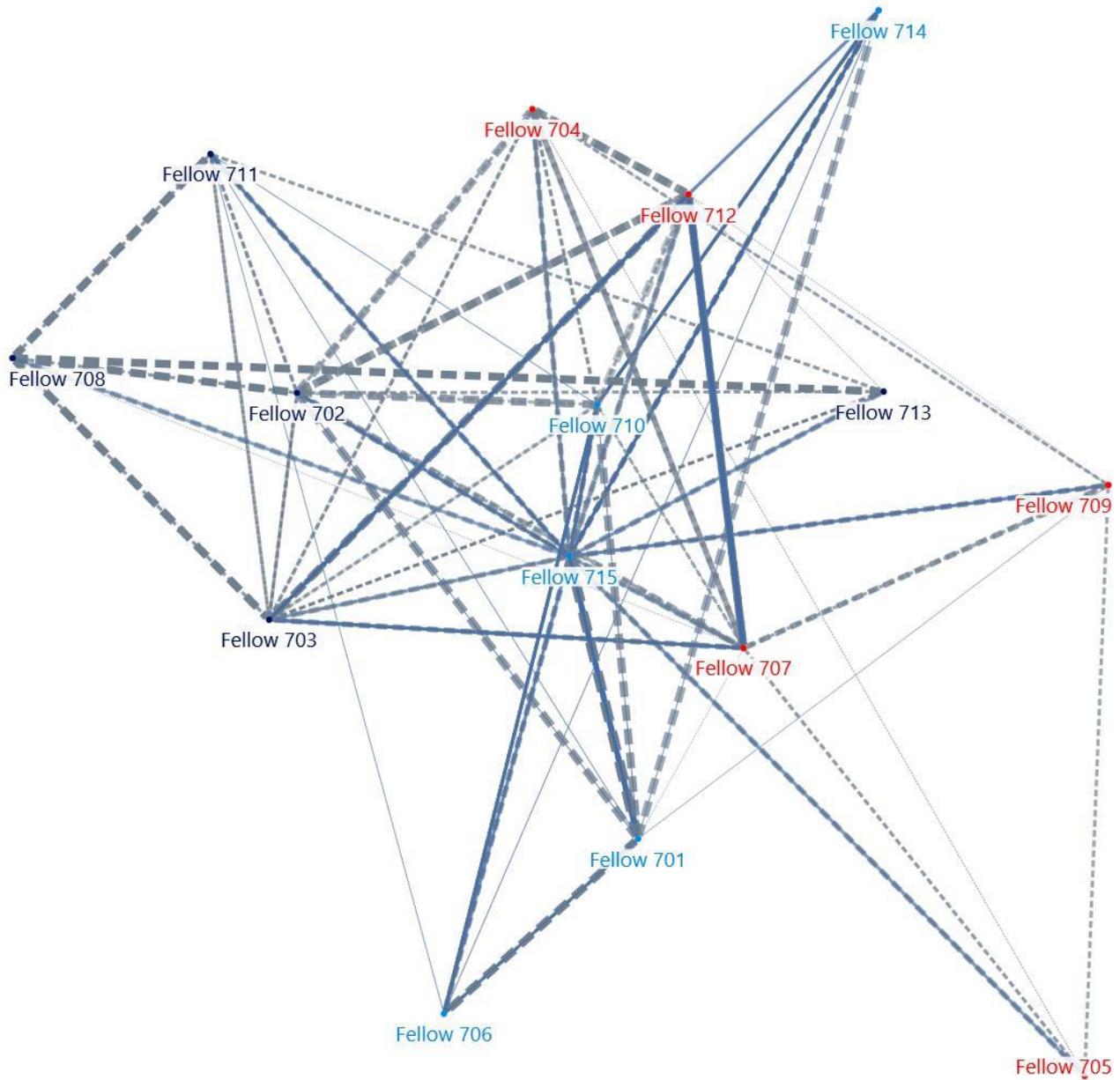
Disciplines

Cohort Seven Fellows comprised another diverse group of disciplines for the cohort as a whole. In Cohort Seven, six of the nine disciplines from the fellowships are represented. There are four fellows in Psychology departments and four in child/human development disciplines. Figure 14 shows that nearly all fellows from psychology connected with the other fellows in their discipline, yet only half of the possible connections from child/human development took place. We can see from Figure 14 that discipline does not play a strong role in the structure of this network, which may be a result of the newness of the relationships and the cohort, and some time spent getting to know all of their peers. In fact, among all within-cohort connections in Cohort Seven, 79.8% were interdisciplinary. This is the highest within-cohort interdisciplinary group of the seven cohorts.

Retention

While retention among a new cohort is not a valid measure, we can note that among the Cohort Seven fellows, nine of the 15 fellows connected with more than six of the other fellows in their network, putting the retention rate for this cohort at 60%. This rate falls in the middle of the range of all cohorts' retention rates. Having just completed their first fellowships 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 Seven is four, meaning every fellow connected with at least four other fellows outside of connections made at mandatory program events.

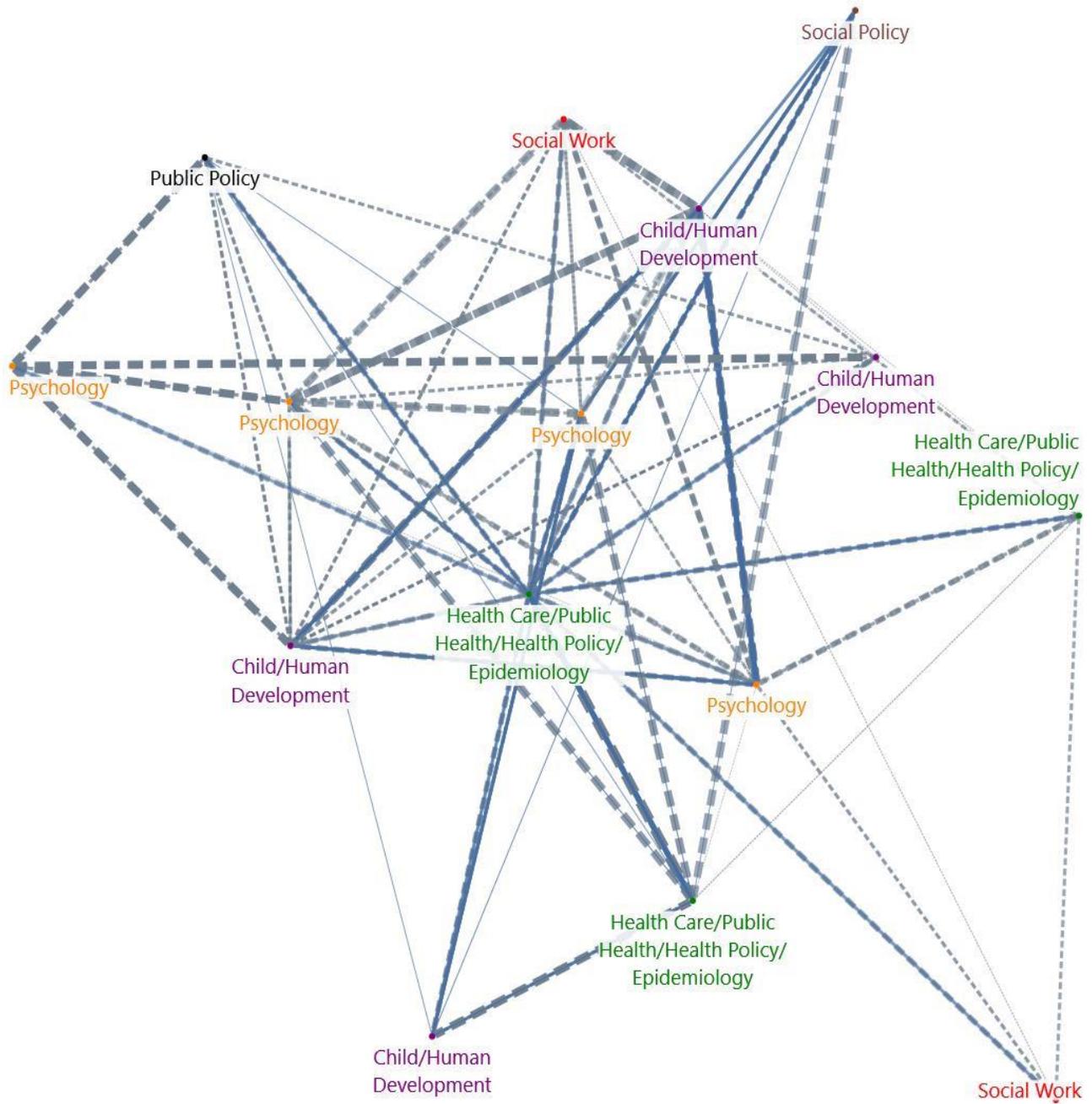
Figure 13. Cohort Seven Connections: Small Group



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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.
- Small group assignment is indicated by color.

Figure 14. Cohort Seven Network: Academic Discipline



Notes:

- Dashed, grey lines represent virtual interactions; solid, steel blue lines indicate in-person interactions.
- 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.
- 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 7. Cohort Seven Descriptive Statistics

Cohort Seven Fellow	Degree	Betweenness Centrality
Fellow 715	14	17.800
Fellow 704	8	1.900
Fellow 707	10	4.700
Fellow 708	6	0.367
Fellow 703	9	1.917
Fellow 712	9	3.800
Fellow 709	6	0.950
Fellow 711	8	2.767
Fellow 702	10	3.067
Fellow 714	5	0.500
Fellow 706	5	0.250
Fellow 713	6	0.400
Fellow 710	10	4.350
Fellow 701	8	3.233
Fellow 705	4	0.000
Network Average	7.9	
Network Median	8.0	

Notes:

- *Degree*: Number of connections attached to that fellow.
- *Betweenness*: How important each node/fellow is in providing a “bridge” between different parts of the network.

Full Fellowships Network

All 105 fellows appear in the full fellowships network—the first time in three years that all fellows in the sample were active in the network for the reporting period—and reported a total of 2,498 connections, which is 35% more than the total number of connections reported in FY17. The 2,498 connections reported across the full fellowships network showed some parity in how they occurred and the quality with which they occurred. Slightly more than one-half of the 2,498 connections (1,264, or 50.6%) were recorded as in-person connections, while the other half were virtual (e.g., by email or phone). Many of these connections (1,638, or 65.6%) were reciprocated connections and were counted twice. For example, if Fellow A noted they connected with Fellow B **in person** and Fellow B noted they connected with Fellow A **in person**, this is defined as a reciprocated relationship and is tallied twice in this count. Additionally, if Fellow A reported connecting with Fellow B virtually and in person—regardless of the number of times—that connection is tallied twice. Therefore, for every pair of fellows, the number of connections can range from 0 to 4. Our best estimate of the number of unduplicated interactions is 1,679.⁵

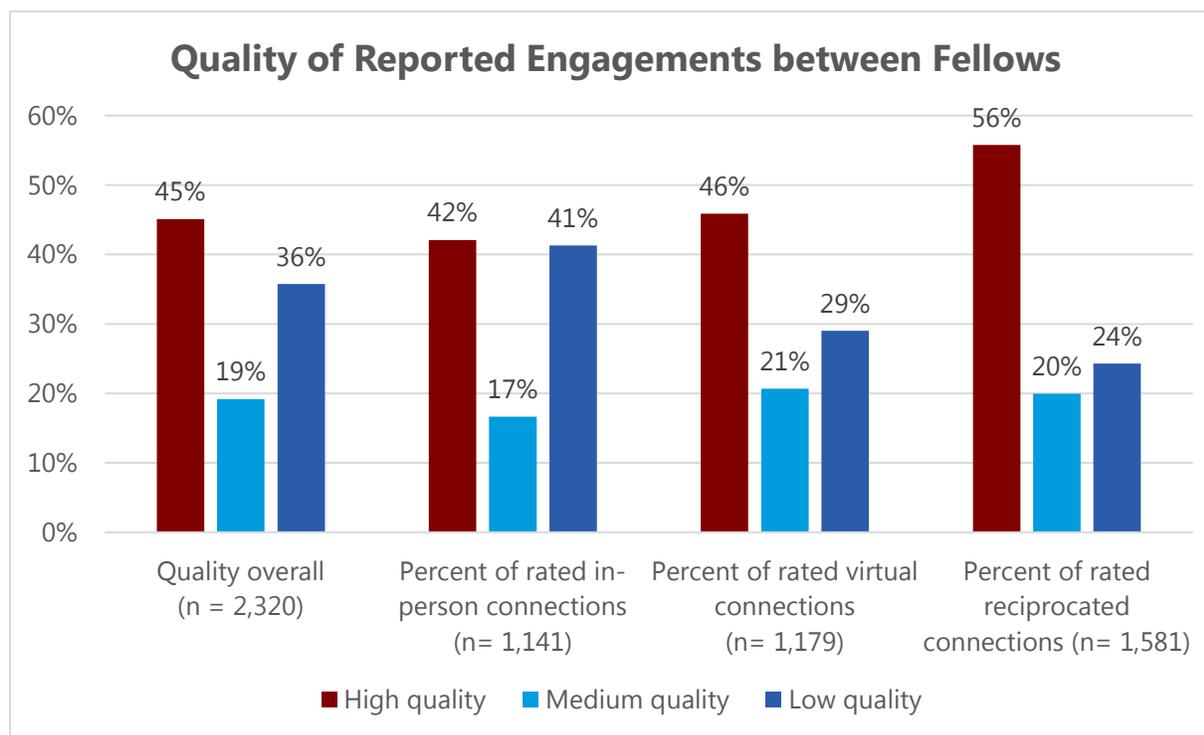
Quality

Of all 2,498 connections, fellows rated 2,320 (93%) of their interactions with other fellows on a five-point Likert scale, choosing from a continuum of weak to strong connections. Of the connections assessed for quality, 1,046 (45%) were rated high quality (a 4 or 5 on the scale). An additional 445 (19%) were rated in the middle, and 829 (36%) were rated low quality (a 1 or 2 on the scale). While the proportion of interactions rated as being of high quality remained unchanged from last year, the proportion of interactions rated as low quality increased by 4%. Figure 15 shows the quality of engagements as reported across several domains, and that high quality interactions led all types of connections.

Quality ratings were provided for 1,141 of the 1,264 (90%) in-person connections, and 480 of these (42.1%) were rated as high quality. It is interesting and somewhat surprising to note that nearly half (566 of 1,179, or 45.9%) of the virtual connections given a quality rating were rated as high quality. Additionally, 81% of the high-quality in-person interactions and 87% 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.

⁵ To estimate the number of unduplicated fellow connections (by type of connection), we took the number of nonreciprocated connections (860) plus half of the reciprocated connections (1638/2=819) and to reach 1,679 estimated unduplicated fellow connections during the reporting period.

Figure 15. Quality of Reported Engagements: Overall, by Type, and Reciprocated



Cohort-Specific Analysis

The 2,498 reported connections were spread across the seven cohorts, though certain cohorts reported more connections than others. Although all fellows completed the survey and all were active in the network this year, there were five fellows who did not report a single engagement during the reporting year (two from Cohort Two, and one each from Cohorts One, Three, and Four). These fellows remained engaged in the network because a fellow reported an interaction with them at some point, even though they did not report a single contact themselves.

Table 8 shows a wide range of total connections reported by fellows within cohorts, from 264 in Cohort Seven to 477 reported by Cohort One fellows. Among the full fellowships network, a total of 756 reported connections (30%) were within-cohort engagements, while 1,742 (70%) were connections made across cohorts. Across the seven cohorts, the majority of all connections were across-cohort connections, ranging from 53% (Cohort Seven) to 83% (Cohort Two).⁶ It is not surprising to see Cohorts Six and Seven with the lowest across-cohort percentages—the later cohorts are current fellows and have not yet had many opportunities to meet fellows from other cohorts (those they meet at the mid-year meeting cannot be counted for them in this survey, while it can be counted for graduate fellows). Across the board, we see increases in across-cohort communication for all cohorts compared to last year. In part, this trend may

⁶ 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).

reflect the more intentional linkages between fellows in different cohorts promoted by the fellowships staff through promotion of the peer-to-peer mentoring program and other joint learning opportunities. It also reflects the maturing of the program, as fellows expand their identity as fellows from being a member of “cohort” to being a member of a larger network of emerging scholars.

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 fellowships network for collaborations. Activities related to various professional associations can enhance cross-cohort interactions. A handful of institutions employ several fellows across cohorts, further facilitating cross-cohort engagements. Having a common academic mentor or policy mentor may have also fostered cross-cohort relationships.

On the other hand, the first year fellows leave the fellowships is a year they are starting new jobs and developing new professional connections. We typically see a dip in total connections for the cohort in their first year out of the fellowships. However, Cohort Five, in their first year out of the fellowships during this reporting period, reported a 56% *increase* in their total connections this year compared to last. While the analysis from their within-cohort connections revealed a dip, the cohort was much more engaged in the overall network. These connections mostly took place outside of their cohort. Table 8 also shows lower quality connections for Cohorts Four and Five, relative to their peers. For Cohort Five, this is a significant change from the prior year. However, the quality rating may be related to the place where they are in their career—starting jobs and establishing new roles. One possible explanation for the low quality of Cohort Four connections is that the majority of their connections are virtual (unlike any other cohort), and the scarcity of in-person interactions year after year may impact the quality of all connections.

Table 8. Full Fellowships Connections: Quality, Type, and Cohorts

	Cohort One prior yr	Cohort Two prior yr	Cohort Three prior yr	Cohort Four prior yr	Cohort Five prior yr	Cohort Six prior yr	Cohort Seven	Total Network prior yr
Total Connections	477 382	289 259	364 414	304 260	414 266	386 267	264	2,498 1,848
% High Quality	54.7 51.3	49.2 44.0	46.3 41.8	28.2 27.3	33.6 41.7	53.3 52.1	48.4	45.1 45.2
% In-Person	56.0 50.3	51.2 59.5	50.5 59.2	42.1 45.0	57.7 35	50.0 46.1	39.8	50.6 50
% Virtual	44.0 49.7	48.8 40.5	49.5 40.8	57.9 55.0	42.3 65	50.0 53.9	60.2	49.4 50
% within cohort	30.0 52.8	16.6 30.6	28.3 39.4	30.6 45.0	25.4 40.1	36.8 34.8	47.0	30.3 33.2
% across cohort	70.0 47.2	83.4 69.4	71.7 60.6	69.7 55.0	74.6 59.9	63.2 65.2	53.0	69.7 66.8

Academic Discipline

As noted in Table 9, fellows self-identified as having one of nine different academic disciplinary categories listed on the survey. The distribution among these nine categories are as follows: 41 in social work programs; 27 in psychology programs; 11 in human or child development programs; 11 in health-related programs, such as public health, medicine, or nursing; five in sociology programs; four in public policy programs; three in social policy programs; two in education programs; and one in a criminal justice program. As might be expected, given the fellowships' early composition, the most common discipline is social work, studied by 39% of the total fellowships network. One-quarter of the fellows in the fellowships' first seven cohorts were enrolled in psychology programs upon entering the program. Child/health development and health care disciplines each host 10.5% of the fellows, and the remaining five disciplines combined are home to 14.4% of the 105 fellows in the sample.

As summarized in Table 9, the percentage of interactions among fellows who share a common discipline varied. However, 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 fellowships network as a whole (0.42 versus 0.22), and the 11 fellows in child/human development also had a 0.42 graph density. On the other hand, the one-quarter of the fellows in psychology reported only a 0.21 graph density, similar to

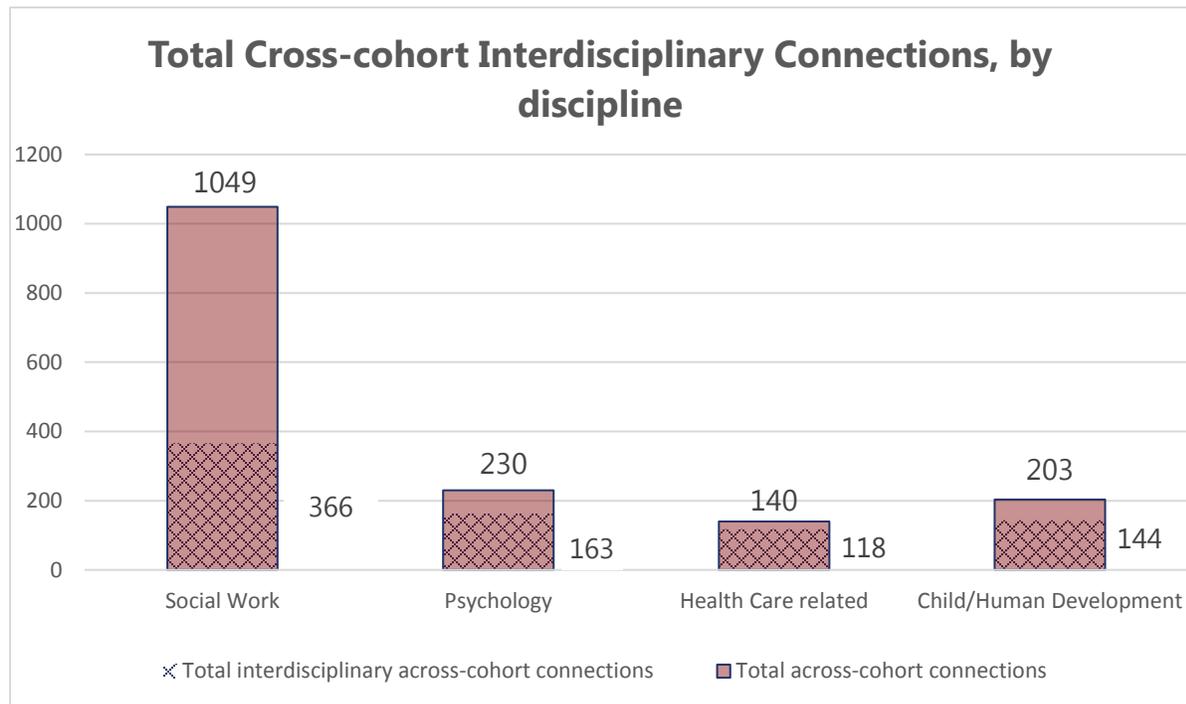
the full network graph density. This specific pattern may reflect the variation in content and focus of study found among the psychology fellows. The four fellows enrolled in public policy programs reported the highest within-discipline density, with 67% of all possible connections among these four fellows being made.

Table 9. Academic Discipline for Full Fellowships Network

Discipline	Fellows	% of Fellows	Graph Density
Social Work	41	39.0	0.415
Psychology	27	25.7	0.217
Child/Human Development	11	10.5	0.418
Health Care/Public Health/ Health Policy/Epidemiology	11	10.5	0.273
Sociology	5	4.8	0.200
Public Policy	4	3.8	0.667
Social Policy	3	2.9	0.000
Education	2	1.9	0.000
Criminal Justice	1	1.0	N/A

While we know people are connecting by their disciplines, we also know they are talking to others. Over half (55%) of all reported fellowships connections were interdisciplinary. Additionally, while we know the majority of all connections for the reporting period were across cohorts, those connecting outside of their cohort are largely doing so across disciplines as well. Of the 1,742 cross-cohort connections, over half (53%) connected with fellows outside their discipline as well. Figure 16 shows the proportion of interdisciplinary connections among all cross-cohort connections by discipline for the four most populous disciplines in the network. The large majority of cross-cohort connections reported by fellows in psychology, health care-related, and child/human development fields were also interdisciplinary. While the cross-cohort connections reported by social work fellows were mostly within social work, one-third (35%) were interdisciplinary. This is significant given the pervasiveness of social work fellows throughout the network and the inherent interdisciplinary nature of the social work field.

Figure 16. Cross-cohort Interdisciplinary Connections



Figures 17 and 18 summarize the reported interactions for the full network, showing all interactions both within and across cohorts (Figure 17) and those only occurring across cohorts (Figure 18). In Figure 17, each fellow’s unique identifier and *within-cohort interactions* are highlighted by their Cohort color. In both figures, *across-cohort interactions* are highlighted in grey. The fellowships network had an overall graph density of 0.218, meaning that 21.8% of all possible connections between all fellows in the fellowships network occurred during the reporting period, a slight decrease over the possible connections identified in FY17. A decrease in graph density is not unexpected over time when new members are added to the network. In this case, 15 new fellows joined the network in 2018.⁷ 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 that any one fellow was active in the program with less than 30% of the total sample.

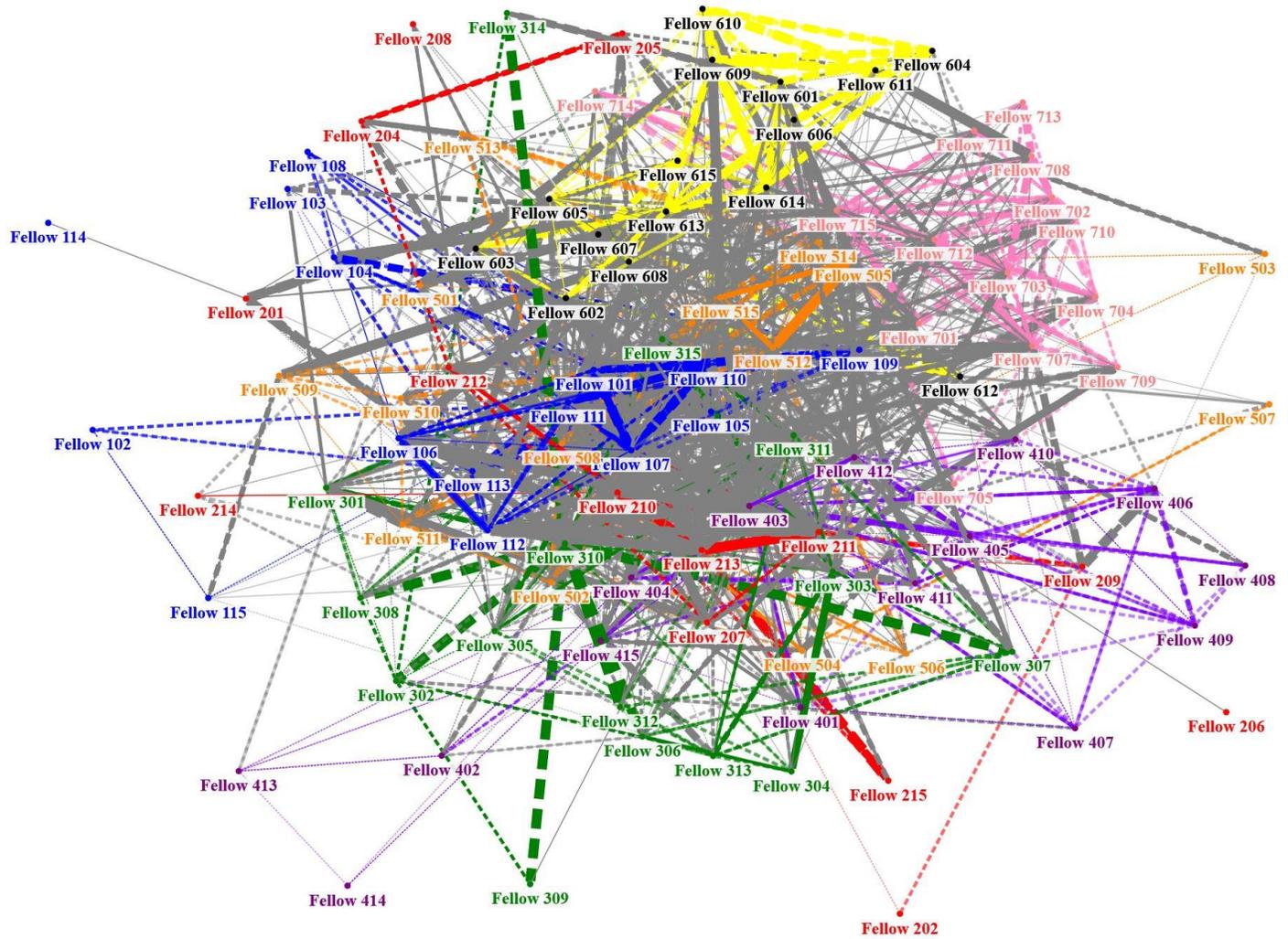
The data in Table 10 summarize the 2,498 connections reported across the full fellowships network. Overall, the number of connections reported by each fellow ranged from 1 to 63, with the “average” fellow reporting 22.6 connections. The minimum degree of 1 indicates all 105 fellows were active in the network the past year, connecting with at least one other fellow in the

⁷ The fellowships network for this survey was the 105 fellows through Cohort Seven.

network.⁸ The maximum number of fellows any one fellow connected with is ten less than last year, despite adding 15 more fellows to the network.

⁸ While four fellows dropped from their cohort network – meaning they did not engage with anyone from their cohort during the reporting period – all fellows engaged with at least one other fellow from the full fellowships network, keeping all 105 fellows active in the full network during the reporting period.

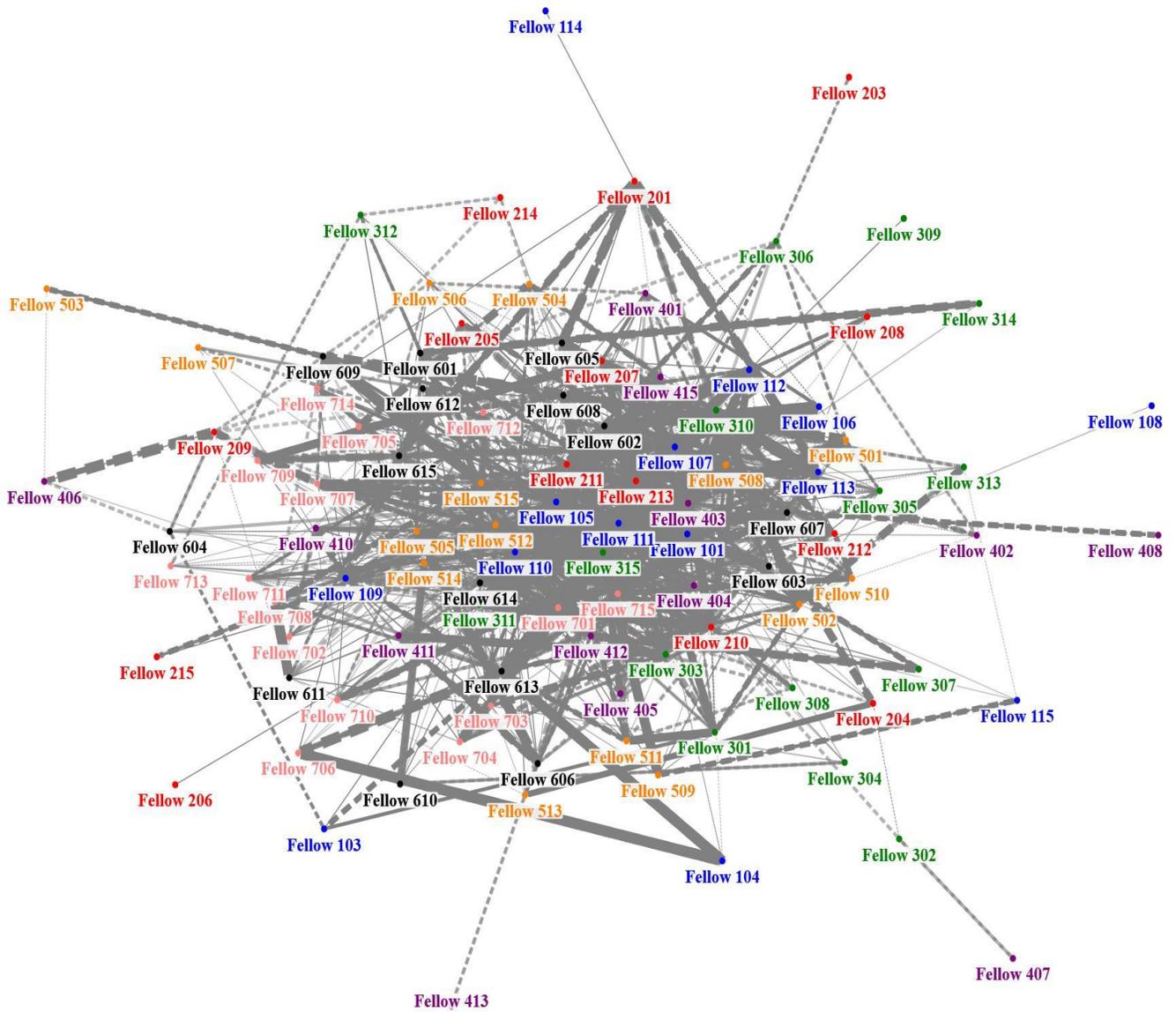
Figure 17. Full Fellowships Network: All Interactions



Notes:

- Dashed lines represent virtual interactions; solid lines indicate in-person interactions.
- 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.
- Blue lines indicate Cohort One's within-cohort interactions.
- Red lines indicate Cohort Two's within-cohort interactions.
- Green lines indicate Cohort Three's within-cohort interactions.
- Purple lines indicate Cohort Four's within-cohort interactions.
- Orange lines indicate Cohort Five's within-cohort interactions.
- Yellow lines indicate Cohort Six's within-cohort interactions.
- Pink lines indicate Cohort Seven's within-cohort interactions.
- Grey lines show cross-cohort interactions.

Figure 18. Full Fellowships Network: Cross-Cohort Interactions



Notes:

- Dashed lines represent virtual interactions; solid lines indicate in-person interactions.
- 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.
- Blue discs indicate a Cohort One fellow.
- Red discs indicate a Cohort Two fellow.
- Green discs indicate a Cohort Three fellow.
- Purple discs indicate a Cohort Four fellow.
- Orange discs indicate a Cohort Five fellow.
- Black discs indicate a Cohort Six fellow.
- Pink discs indicate a Cohort Seven fellow.
- Grey lines show cross-cohort interactions.

Table 10. Full Fellowships Network Descriptive Statistics

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 213	54	15	359.014	Social Work
Fellow 111	61	10	313.409	Social Work
Fellow 311	54	2	298.059	Social Work
Fellow 110	63	19	246.823	Social Work
Fellow 403	51	-7	218.975	Social Work
Fellow 315	59	15	205.783	Social Work
Fellow 105	56	33	199.330	Social Work
Fellow 210	50	9	198.141	Social Work
Fellow 310	39	12	156.383	Social Work
Fellow 109	45	16	137.372	Psychology
Fellow 404	34	12	123.761	Social Work
Fellow 415	27	-2	115.476	Social Work
Fellow 614	50	32	114.603	Health Care/Public Health/Health Policy/Epidemiology
Fellow 512	52	24	106.250	Child/Human Development
Fellow 201	11	3	106.054	Social Work
Fellow 412	39	-4	101.157	Child/Human Development
Fellow 505	42	25	94.400	Child/Human Development
Fellow 113	33	0	93.686	Public Policy
Fellow 211	40	-2	92.791	Social Work
Fellow 514	48	23	92.371	Psychology
Fellow 107	43	10	91.938	Social Work
Fellow 101	40	20	88.615	Social Work
Fellow 613	39	20	71.710	Social Work

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 508	40	6	70.353	Social Work
Fellow 515	42	17	70.224	Social Work
Fellow 607	32	10	68.719	Sociology
Fellow 502	28	-1	60.663	Social Work
Fellow 608	31	4	47.166	Social Policy
Fellow 615	31	10	45.322	Public Policy
Fellow 715	41	N/A	45.100	Health Care/Public Health/Health Policy/Epidemiology
Fellow 306	18	-3	43.537	Health Care/Public Health/Health Policy/Epidemiology
Fellow 701	30	N/A	40.778	Health Care/Public Health/Health Policy/Epidemiology
Fellow 712	28	N/A	39.067	Child/Human Development
Fellow 405	19	5	35.743	Social Work
Fellow 609	23	5	33.929	Psychology
Fellow 410	24	11	33.907	Psychology
Fellow 406	13	-3	29.724	Psychology
Fellow 605	27	8	27.066	Public Policy
Fellow 411	22	0	26.497	Education
Fellow 106	23	7	25.358	Social Work
Fellow 601	23	2	24.740	Psychology
Fellow 714	18	N/A	24.456	Social Policy
Fellow 209	12	-10	24.174	Psychology
Fellow 303	25	-15	22.968	Child/Human Development
Fellow 603	26	12	22.871	Social Work
Fellow 302	12	1	22.598	Psychology

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 703	25	N/A	21.349	Child/Human Development
Fellow 611	22	8	20.728	Psychology
Fellow 207	25	-2	20.152	Social Work
Fellow 112	24	10	19.610	Social Work
Fellow 504	15	-6	18.986	Social Work
Fellow 513	12	-8	18.652	Psychology
Fellow 612	20	4	17.677	Sociology
Fellow 401	16	-2	16.838	Social Work
Fellow 707	25	N/A	16.141	Psychology
Fellow 312	13	-2	14.941	Child/Human Development
Fellow 301	17	3	14.445	Social Work
Fellow 305	21	-8	14.322	Social Work
Fellow 313	13	-19	13.926	Social Policy
Fellow 604	14	4	13.742	Psychology
Fellow 602	28	3	13.243	Social Work
Fellow 606	25	-10	12.005	Psychology
Fellow 510	21	2	11.087	Health Care/Public Health/Health Policy/Epidemiology
Fellow 711	21	N/A	9.707	Public Policy
Fellow 212	21	9	9.580	Social Work
Fellow 704	19	N/A	8.955	Social Work
Fellow 511	19	-5	8.668	Social Work
Fellow 610	16	2	8.052	Psychology
Fellow 407	9	-4	7.952	Social Policy
Fellow 705	19	N/A	7.665	Social Work

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 506	14	-5	7.492	Psychology
Fellow 509	12	-4	7.083	Psychology
Fellow 402	8	-9	7.003	Health Care/Public Health/Health Policy/Epidemiology
Fellow 304	11	-5	6.846	Health Care/Public Health/Health Policy/Epidemiology
Fellow 702	22	N/A	6.191	Psychology
Fellow 710	20	N/A	6.025	Psychology
Fellow 114	7	-11	5.101	Social Work
Fellow 708	19	N/A	5.014	Psychology
Fellow 204	9	-1	4.933	Health Care/Public Health/Health Policy/Epidemiology
Fellow 104	10	-13	4.261	Psychology
Fellow 501	15	-9	3.976	Health Care/Public Health/Health Policy/Epidemiology
Fellow 307	11	2	3.879	Child/Human Development
Fellow 205	10	-1	3.591	Psychology
Fellow 709	16	N/A	3.508	Health Care/Public Health/Health Policy/Epidemiology
Fellow 308	12	-5	3.485	Social Work
Fellow 413	5	-3	3.031	Education
Fellow 713	14	N/A	2.756	Child/Human Development
Fellow 103	7	-2	2.192	Psychology
Fellow 706	11	N/A	2.179	Child/Human Development
Fellow 409	8	1	2.159	Sociology
Fellow 408	6	-1	1.559	Social Work
Fellow 214	5	1	1.408	Sociology

Fellow	Degree	Change from Prior Year	Betweenness Centrality	Discipline
Fellow 503	4	-12	1.278	Psychology
Fellow 314	5	1	1.019	Child/Human Development
Fellow 507	5	-5	0.585	Sociology
Fellow 108	8	4	0.474	Social Work
Fellow 309	3	0	0.306	Psychology
Fellow 208	5	2	0.177	Social Work
Fellow 102	3	-5	0.000	Social Work
Fellow 206	1	-2	0.000	Psychology
Fellow 203	2	2	0.000	Health Care/Public Health/Health Policy/Epidemiology
Fellow 414	3	0	0.000	Criminal Justice
Fellow 115	1	0	0.000	Psychology
Fellow 215	4	-3	0.000	Social Work
Fellow 202	2	-1	0.000	Social Work
		Prior Year		
Network Average	22.63	20.02	47.11	
Network Median	20.0	18	17.68	

Discussion

The first seven 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 fellowships activities during their two-year fellowships term and through access to the full fellowships network, these scholars have the opportunity to collaborate within and across disciplines. These collaborations have 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 fellowships events. The majority of these interactions are of high quality and reflect strong, reciprocal relationships among fellows. Increasingly, fellows collaborate on a wide range of activities. These include journal articles and professional presentations as well as efforts to influence public policy and reform practice. The analysis documents a high proportion of cross-cohort engagements—more than two-thirds of all reported engagements by the 105 fellows who responded to the survey occurred with someone outside their specific cohort. Aligning with one of the four primary goals of the fellowships—to increase interdisciplinary knowledge and research—the majority (55%) of all reported connections are ones that crossed discipline boundaries. In the most recent five cohorts, the majority of the within-cohort connections reported by these fellows were interdisciplinary, in part a reflection of the program’s growing interdisciplinary membership.

Table 11 summarizes the density, betweenness centrality, and retention rate for each cohort and presents an average for the network as a whole. The table also presents the average percentage of cross-cohort connections represented in each cohort as well as for the full network. As noted in this table, Cohort Two once again had the greatest percentage of cross-cohort connections, followed by Cohort Five. The relatively high density of Cohorts One and Six accounts in part for the relatively low betweenness centrality exhibited—these networks are 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 Five networks are less dense, with the shape of the network being driven by a subset of fellows who are strongly connected to one another—as reflected in the high betweenness centrality scores—and more responsible for drawing in less active members into the network. When comparing these numbers to last year’s results, the overall network density is only slightly lower than last year. Additionally, retention rates within each cohort varied this year as compared to last: some increased, some declined, and some remained the same. Overall, however, the Fellowships network remains well connected and supportive of the fellows.

While capturing the fellowships network’s strength and structure, our annual surveys represent one snapshot of how fellows are relating to those in their cohort and to the fellowships as a whole. It is important to note that an individual fellow may be more or less active in the network during a 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. Within the context of our data, we are limited in analyzing what is driving these connections. Although we can look into each fellow’s discipline and small group assignment at the start of the fellowships, we have not analyzed how geography, current institutional affiliations, professional membership associations or other variables might explain connections or sustained relationships among fellows. Going forward, we will continue to monitor trends reflected in these data and maximize our ability to capture and explain within and cross-cohort interactions.

Table 11. Summary of Full Fellowships 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 prior yr	Cohort Seven	Mean prior yr
Cohort-Specific Statistics								
<i>Network Density</i>	0.60 (0.63)	0.30 (0.36)	0.48 (0.54)	0.50 (0.50)	0.39 (0.55)	0.68 (0.48)	0.56	0.50 (0.51)
<i>Betweenness Centrality (mean)</i>	2.571 (2.433)	5.67 (4.42)	3.867 (3.333)	4.133 (3.80)	5.467 (3.133)	2.267 (4.00)	3.067	3.863 (3.519)
<i>Retention Rate</i>	0.67 (0.67)	0.07 (0.07)	0.47 (0.33)	0.67 (0.47)	0.40 (0.67)	0.93 (0.53)	0.60	0.54 (0.46)
Across-Cohort Interactions (%)	70.0 (47.2)	83.4 (69.4)	71.7 (60.6)	69.7 (55.0)	74.6 (59.9)	63.2 (65.2)	53.0	69.3 (66.8)

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