How We Rise

How social networks in Charlotte impact economic mobility

Technical Report, Methodology, and Appendices

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October 2020

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I. Introduction

The overall goal of the How We Rise Charlotte (HWRCLT) study was to better understand how Charlotte residents' personal social networks function and allow individuals to marshal and exchange social capital and resources to enhance mobility. This study is novel in that no other study to date applies quantitative network analysis to describe the personal social network characteristics for jobs, housing, health care, child care, education (and the COVID-19 pandemic) at the group level for a specific geographical location with uneven economic mobility.

How We Rise Study Purpose and Goals

The purpose of the HWRCLT study was to explore the social network patterns of Charlotte residents. The study used a representative sample based on race, income, gender, age, and neighborhoods, with a particular focus on hard-to-reach groups. We also wanted to better understand how the personal social networks of Charlotte residents function. This included how social networks allow individuals to marshal and exchange social capital and resources to enhance mobility.

To accomplish the goals of this project, The Brookings Institution, under funding from The Gambrell Foundation, conducted one-on-one interviews with 216 residents of Charlotte. We asked them about who they consulted with about jobs, education, housing, child care, health care and the COVID-19 pandemic, the characteristics of those in their networks, and how strong their connections were.

Brookings undertook a unique research design where the Qualitative Researcher, Community Liaisons, and interviewers were based in Charlotte. Normally, these various functions would be handled by one vendor that would likely have been located outside of the Charlotte area.

As is common in interview-based research, participants who completed their interviews received a $50 gift card.

In this report, we detail how we developed and tested the questionnaire, recruited participants, and analyzed the data.

Defining and Operationalizing Social Networks

Social capital is applicable in a variety of contexts. This study focuses on social capital that serves two basic functions: support from family, and benefits through networks outside the family (Portes, 1998). An important source of social capital are social networks. Various studies in the economic literature examine the intersection between poverty and social networks by focusing on how social network capital (that originates within relations) facilitates or impedes low-income individuals, families, and households' efforts to rise out of poverty. Social network capital can be an important facilitator of upward mobility (Chantarat and Barrett, 2012).

Social networks are the web of social ties that surround an individual and are useful in describing patterns of relationships that are not easily explained by social class alone (Berkman, 1984). Network analysis allows for the examination of any potential relationship imaginable that people have with one another. Social network analysis comprises methods to

reveal the connections people have to one another, their differences, and outcomes that are the reflections of the cultural context in which they are embedded (Berman, 1984).

Social network analysis enables a rich evaluation of social structure, mobility, and interactions between and among individuals in a specific location. The structural form influences the flow of resources through specific contact roles. Several characteristics are important to measure in order to gain an understanding of how networks enable mobility. This analysis will aid in the generation of interventions and policies. These policies can address the sharp divides in social capital that contribute to Charlotte's underperformance in terms of social mobility, and broader inequalities. The structural dimensions of networks studied here include:

1. Network Size: the number of people (nodes) in a network
2. Network Role: the nature of the relationship between a participant and each social contact
3. Network Function: the kind of social support provided by a participant's social contacts
4. Strength: the extent to which social contacts offer support as measured by the frequency of occurrence of the number of links on each role, constituting its degree
5. Network Formation: how the participant met their social contacts
6. Homophily: the homogeneity of network members and how similar they are in terms of age, gender, and race
7. Spatial Dimensions: the geographic spread of personal networks
8. How these characteristics vary by participant attributes

For a complete description of the structural dimensions of networks examined in this study refer to Table 1.

Table 1: Network Measures of the Social Network for Participants in the How We Rise Charlotte Study (2020)

	Network Definitions
Network	The networks constructed for each subject interviewed for this analysis are defined by the social contacts each participant provided information about during the interview process. Each participant provided information on their social contacts' reliability, sensitivity, and perceived trustworthiness. Key social mobility factors frame the social network analysis around five focus areas related to jobs/career, education, health care, housing, and child care. Each participant had eight networks, each containing seven or more functions that define a unique network configuration.
Network Size	Network size refers to the number of social contacts each participant identified during the study. On average, the number of social contacts or network size was eight.

Network Role	Network role refers to the nature of the relationship between a participant and each social contact they discussed during the interview process, for example: mother, father, co-worker, mentor, etc. The number of roles was endogenously determined by the survey results; 64 relationships were identified from the survey data. The 64 relationships combine to form 28 network roles. This data compression is the result of many survey participants having more than one social contact serving in the same network role, for example, a person may have two mentors, co-workers, or neighbors.
Network Function	Network function refers to the kind of social support provided by a participant's social contacts. The type of functions includes financial assistance, information gathering, general advice, emotional support, networking, mentoring, business references for loans or housing, and logistical support (such as assistance with transportation and meals). There were seven predefined support functions, and additional data collected for individual responses.
Strength	Strength is defined as the standard normal statistical transformation of the node degree. Social roles (i.e., nodes) are linked by the function they perform. The number of links on each role constitutes its degree. We take the average degree for each role across all participants in a demographic group, then apply a Standard Normal (μ=0, σ=1) transformation of the degree value. This converts the degree to a standardized Z score allowing for comparison across social roles and demographic groups.
Average Weighted Degree	We consider each respondent's (i.e., participant's) node's allocable weights. The apportionable weights can be defined as a reallocation of strength s_i, which corresponds to a node's actual advice, information, or resource. $$r_i = \frac{s_i}{k_i} \ (= r_i)$$ Here, k_i is the degree of node i, which is defined as the total number of contact ties connected to it, i.e., $$k_i = \sum_j a_{ij}$$ and s_i is the strength of node i, which is defined as the sum of the weights of all the ties connected to it, namely, $$s_i = \sum_j w_{ij}$$ (Amano, Ogawa, and Miyake, 2018; Perry, Pescosolido, and Borgatti, 2018; Newman, 2018).

Network Formation	Network formation refers to how the participant met their social contacts. Formation is reported for each demographic cross section. The proportion of each social role is represented by the size of the boxes in the column on the left; the proportion of how the social contact was formed is illustrated by the size of the boxes in the column on the right. The flows between a particular social role and how a contact was initiated is represented by the proportional flows between the boxes in the respective columns.
Betweenness Centrality	Betweenness centrality measures the extent to which a vertex lies on paths between other nodes. Nodes with high betweenness may have considerable influence within a network through their control over information and resources passing between others.

The following research questions guided the research:

1) What are the structural characteristics of personal ego-centered networks?
    a) Number of nodes (size of personal networks)
    b) Formation
    c) Function
    d) Strength
    e) Homophily
2) How do networks characteristics vary by attributes of the participant?

For this study, the team adopted a network approach to model the complex flow of resources among a wide range of connections that flow to the ego, or study participant. The structural form influences the flow of resources through specific ties. The social networks were conceptualized with specific attention to the roles and the different forms of support they provide. The team adapted the same techniques outlined in Burt (1984); Michael, Wasserman, and Wellman (1994); Ezell, Ferreira, Duncan, and Schneider (2018); and Perry, Pescosolido, and Borgatti (2018) to explore personal ego-centered networks and operationally define the composition of these networks using name generators.

II. Sample Design

An early and important decision of the How We Rise Charlotte research project process was the development of strategies for sampling and data collection. Following sampling decisions, another important consideration for network research was the mode of data collection.

Social network data were collected in a systematic way, using a structured interview design (i.e., face-to-face interview approach). This strategy was selected to ease the burden on participants from having to recall information required by other approaches such as telephone or self-administered surveys. Interviews administered face-to-face offer a number of benefits, such as the availability of interviewers to answer questions, building rapport with the participant, and offering encouragement and positive enforcement. However, ego-centered network studies can be vulnerable to interview effects. Training interviewers and weekly team discussions regarding experiences and reminders of proper techniques for how to properly elicit information was an effective approach to reducing error.

Sampling design, data collection, and interviewer training are part of any normal research process. Many of the issues are well known and have been addressed in other studies. As the HWRCLT team prepared to field the survey, it was faced with an unprecedented crisis: the COVID-19 pandemic. Faced with this challenge, a decision had to be made regarding how the questionnaire would be administered. A virtual approach to the structured interview approach was adopted, additional interviewer training implemented, along with participant, recruitment, and questionnaire design modifications. Figure 1 (see pg. 20) captures the HWRCLT project timeline, COVID-19 interruption, and analysis. What follows is an overview of the strategies and subsequent modifications.

In this study, the sample was defined by a geographic area and sociodemographic characteristics. A representative sampling technique was used where residents from the Charlotte metropolitan region were recruited and selected based on age, gender, race/ethnicity, income, length of residency (at least six months), and zip code. Observations were drawn by contacting people who live in the Charlotte metropolitan region until subgroups within the sample matched census rates (census data was used to calculate rates relating to age, sex, race/ethnicity, etc.).

The central issue in sample design is representativeness. While a larger sample size reduces the likelihood of sampling errors and increases the likelihood that the sample accurately reflects the target population, the Charlotte sample was considered representative.

The sampling unit was the ego or participant. Any inferences from the sample, therefore, refer only to the defined population from which the sample was selected.

The HWRCLT research goal was to collect accurate and comprehensive personal network data from a representative sample of residents who live or have lived in the Charlotte metropolitan region for at least six months. Face-to-face (virtual) interviews were conducted using a Qualtrics survey platform (2019).

The research design utilized a quantitative social network analysis approach to determine dynamic features of the resulting networks. Recruitment and sample generation were facilitated by an outreach strategy that included soliciting participation using Community Liaisons,

Community Influencers, and an effective social media marketing campaign with two webinars. A screening tool or presurvey was developed as a strategy to maximize sample variation, which permitted sampling to continue until representation targets were reached. In this study, the sampling frame consisted of residents that responded to the outreach efforts and met inclusion criteria.

III. Recruitment of Representative Sample of Participants

We spent a considerable amount of time reviewing the demographics of Charlotte and its various neighborhoods, and then identified specific neighborhoods and zip codes from which we wanted to ensure participation. The project's Community Liaison team created a strategic outreach plan to obtain a representative sample of Charlotte based on race, gender, income, age, and zip codes. To reach our goals, we reviewed data on income diversity, schools, economic development, racial and ethnic diversity, crime and safety statistics, and access to public transportation.

We also wanted to ensure that we had adequate representation from African American and Latino residents. To gain input from these communities, we strategically focused initially on West Charlotte, East Charlotte, and Midtown, where there is a greater concentration of Black and Latino residents.

Prior to interfacing directly with the community, the Community Liaisons identified and engaged with several community organizations whose constituency could both help fulfill the project's sampling needs and benefit from the project outcomes. Community Liaisons quickly went to work and had introductory conversations with:

- FOR Charlotte
- YMCA of Greater Charlotte
- Charlotte Works
- Freedom Communities
- Local Schools
    - Myers Park High School
    - iMeck Academy
    - James Martin Middle School
    - Queen City STEM Academy

Pre-COVID-19

With target neighborhoods identified, the Community Liaisons partnered with the Research Team to outline an approach for engagement. We hosted community meetings and attended a job fair to build trust, share information about the project with communities, and provide a space where community members could connect and build their networks. We also decided to leverage the online tool, Signup Genius, to register community members for interview slots. This approach allowed residents to self-register or provide their information to the project team to be registered.

West Charlotte: On Feb. 9, 2020, we hosted our first Community Meeting at the Beatties Ford Road Library. Twenty-three residents attended, including senior citizens, single moms, students, Black males, middle-aged couples, and a community member living in transitional housing. The residents were greeted by Community Liaisons and entered a celebratory atmosphere surrounded by balloons and decorations. The meeting opened with an icebreaker that allowed the community members to get to know each other and was followed by more social exchange over dinner catered by City Barbecue. After dinner, the How We Rise Research Consultant explained the remaining activities. Residents were grouped and paired with members of the Research Team who asked about their experiences living in Charlotte and about any barriers that they have faced in their quest for upward mobility. There was also a sign-up table where community members could express their interest in being interviewed as a part of the project at any point during the meeting. A total of 19 attendees signed up for one of the available interview dates. At the conclusion of the meeting, resident questions were answered and they were thanked for their time.

Job X: On Feb. 11, the Community Liaisons and Research Team participated in the Charlotte Job X Job Fair. We secured a booth here to target job seekers looking for opportunities in Charlotte, allowing us to learn more about the gaps they identified in their networks. With How We Rise banners and flyers displayed, we spoke to attendees one-on-one and in small groups to explain the purpose of the project and the importance of community input. Several job seekers were familiar with the Chetty Report and were interested in increasing their chances for upward mobility. One job seeker not only signed up to be interviewed but also volunteered to become a greater part of our efforts. More than 20 people at this event signed up to be interviewed.

Myers Park: On Feb. 25, the Community Liaisons hosted their second Community Meeting at Myers Park High School. Myers Park was selected as it is a unique school with a diverse population. Some of the most affluent families in the district as well as those families and students that live in poverty all share the same learning environment. Administrators, teachers, and staff provide ample support however, some students still struggle to embrace and take full advantage of this support. Over 20 students, parents, and community members attended, including a member of our homeless population who was drawn by the potential to receive information on affordable housing. All were welcomed and then broken into groups to meet with the Research Team where they completed mapping activities in different classrooms and discussed their social networks. At the conclusion of the group activities, the groups returned to the library and were served dinner catered by City Barbecue. Approximately 15 attendees signed up to complete an interview for the project. Themes that emerged from this community meeting were:

- The need to connect and build relationships across racial, social, and economic lines
- More affordable and transitional housing
- The need to share resources with others

Based on these meetings, the How We Rise project team decided to make an effort to also be an information hub for community members. The project was appealing to many because of the needs they were currently experiencing. To fill a more immediate need for information, the

Marketing Team began to share opportunities via the project's social media presence and website.

Following our community meetings, the Research Team began interviewing Charlotte residents. Community Liaisons were onsite for these interviews as a point of contact with the site hosts and to engage with interviewees. We greeted them as they arrived and distributed gift cards as they completed their interviews. We also encouraged them to share project information within their networks.

COVID-19 Adjustments

A few weeks after our last community meeting, concerns around COVID-19 began to heighten. By the time we hosted our March 12 interview sessions, we were beginning to have no-shows citing coronavirus concerns as the reason for not keeping their appointments. Schools, one of our primary event hosts, began to close, and we had to cancel our pre-scheduled in-person community events.

During this time, the Community Liaisons and Marketing Director began to closely partner to develop a strategy for pivoting to virtual activities as our primary means of community engagement. Through these collaborative efforts, the Community Liaisons were able to participate in several live interviews on social media and other virtual platforms that targeted groups where representation was still needed and shared key project information.

Date	Event	Platform	Target Audience
03/24/20	Live interview with George Metz and Kyle King, school administrator and social media influencer	Instagram	African American educators
04/02/20	Live interview with Karen Sutton and Barry White, Jr., teacher and social media influencer	Instagram	African American educators
04/06/20	Live interview with George Metz and Anthony Morrow, former professional athlete	Instagram	African American men
04/13/20	Live interview with George Metz and Anthony Morrow, former professional athlete	Instagram	African American men
04/28/20	Live interview with Karen Sutton and Tone-X, radio personality	Instagram	Middle-aged African Americans

Date	Event	Platform	Target Audience
05/01/20	Recorded interview with Francene Marie played on all Beasley Media outlets	Radio	Cast a wide net to capture a diverse audience
05/06/20	Live interview with George Metz and Cassey Crimmins (FOR Charlotte)	Instagram	Caucasian faith community with a focus on men
05/15/20	Live interview with Karen Sutton and Keyona Osborne (FOR Charlotte)	Instagram	Diverse Charlotte faith community with a focus on women
05/20/20	Multiply Church with George Metz	Podcast	Diverse Charlotte faith community
05/25/20	Live interview with George Metz and Tone-X, radio personality	Instagram	Middle-aged African Americans with a focus on men
05/28/20	Live interview with Karen Sutton and Marcus Wells, former Johnson C. Smith student and social media influencer	Instagram	Young African American men and women
05/28/20	Webinar with George Metz and ● Tone-X, radio personality ● Anthony Morrow, former pro athlete ● Kyle King, school administrator and social media influencer ● Marcus Wells, social media influencer ● Greg Jackson, HEAL Charlotte	Zoom	African American men
6/9/20	Webinar with George Metz and ● Tone-X, radio personality	Zoom	African American men

Date	Event	Platform	Target Audience
	● Tracy Martin, Trayvon Martin Foundation ● Kyle King, school administrator and social media influencer ● Don Thomas, My Brother's Keeper ● Teddy McDaniel, Charlotte Urban League ● Jonathan Gardner, GardHouse		
06/16/20	Webinar with Karen Sutton and ● Ohavia Phillips, Charlotte creative and online talk show host ● Lorri Lofton, social media influencer ● Rooha Haghar, social justice advocate ● Bridgett Hayes, school administrator ● Shreya Mantha, Foundation For Girls	Zoom	Minority women

Other engagement efforts during this time included:

- Charlotte Agenda ad targeting Caucasian community members
- Norsan Media interview with Latina How We Rise Interviewer
- Mailers targeting zip codes with affluent residents

Each of these engagement activities was strategic. Receiving new information from the Research Team on a weekly basis allowed us to focus on how we were progressing toward obtaining a representative sample. As gaps were identified, Community Liaisons actively partnered with the Marketing Director to create opportunities to engage the required audience.

While the Community Liaison and Marketing teams had to shift the engagement strategy, the Research Team had to devise a virtual plan as well. As they were making the shift, Community Liaisons revamped the Signup Genius to capture names and contact information of interested community members so that once a new interview schedule was established, there would be interviewees queued up. This effort connected the project to more than 100 community members. Once interviews resumed, Community Liaisons transitioned signups to the Research Team. By July 2020, we were successful in recruiting a sample of participants that was representative of Charlotte.

IV. Questionnaire Design

The HWRCLT questionnaire design was a multistage process that required focus on several details simultaneously. The design process included evaluating levels of detail asked, different ways questions were asked, the order in which questions were asked, and consideration of how opinions and behaviors were measured in prior surveys, such as the General Social Survey (Burt, 1984) and Pew Research Center's American Trends Panel (Pew Research Center, 2020).

We conducted pilot tests and community meetings with groups during the early stages of questionnaire development in order to better understand how residents thought about mobility related issues and comprehended questions. Pretesting the HWR questionnaire was an essential step in the questionnaire design process to evaluate how residents would respond to the overall questionnaire and specific questions.

Question Development

There were several steps involved in developing the HWR questionnaire. The first was meeting with the project director to identify what topics would be covered in the questionnaire. This involved thinking about research that had already been conducted in this area and related topics in the city, the impact of the Chetty study (Chetty, Hendren, Kline, and Saez, 2014) on the city and relevance to the public, policymakers, and the media.

Questionnaire development was a collaborative and iterative process where the HWRCLT team met and discussed questionnaire drafts during the development phase. The Research Lead also worked with faculty collaborators from Arizona State University and the University of North Carolina at Charlotte. After the questionnaire was drafted and reviewed, the team pretested the questionnaire and finalized revisions before fielding the survey in early March 2020.

Name Generators and Interpreters (Open- and Closed-Ended Questions)

The questionnaire contains three sections:

- The first section: The Core Module, contains general questions.
- The second section: The Social Relationship Module focuses on questions about the participant's social relationships and includes name generators and interpreters.
- The third and final section: The Core Module 2, explores changes experienced in the participant's life, their beliefs, experiences, and perceptions.

The Core Modules contain primarily closed-ended questions, where participants were asked to choose from a list of answer choices. The Social Relationship Module contains two sections: questions about (1) the long list of the participants' social relationships and (2) the short list of participants' social relationships (i.e., the most important five when it comes to each theme). This section featured open-ended questions where the participant provided responses in their own words and the interviewer recorded those responses (typed responses in designated fields). Below are examples of questions contained in the Social Relationship Module sections.

Social Relationship Module Section 1:

> Q30: During the past 6 months, how many people have provided advice, information, resources, or help with important matters?
>
> Q31: Who are those people?
>
> Q32: Regarding the people you mentioned, what is your relationship with each? Let's start with the first person... (Interviewer: enter names/initials in box next to relationship)

Social Relationship Module Section 2:

> Q44: During the past 6 months, how many people have YOU gone to for advice, information, resources, or support about the following...? (Interviewer: exclude mandated interactions such as supervisors or managers unless it was initiated by respondent.)
>
> o Jobs or work _____
>
> o Housing _____
>
> o Healthcare (doctors, specialists, dentists) _____
>
> o Childcare and or adult care _____
>
> o College (education) and or training (work force, professional, vocational) _____
>
> Q45: Who are the 5 people you discuss important matters related to jobs with?
>
> o 1st Person _____
>
> o 2nd Person _____
>
> o 3rd Person _____
>
> o 4th Person _____
>
> o 5th Person _____
>
> Q46: What are the age, gender, race, and ethnicity of the 5 people you discuss matters related to jobs or work with?

Defining Network Boundaries

Personal social networks serve a variety of functions. For example, social interaction is often goal directed and people consciously or subconsciously engage selectively in relationship ties for particular reasons. Cutrona and Russell (1990) referred to this behavior as the functional specificity concept. Networks contain many types of relationships and vary in type of connection, function, strength, how they are formed, and other characteristics. While certain ties are considered primary, other ties can be considered specialized, or are useful in more limited ways, such as when one is looking for a job or housing. Functional specificity is an important distinction because it represents a shift from "how many" to the functional characteristics of the alters.

The goal of capturing an exhaustive census of a participant's personal social network is impractical. However, reaching out to a wider circle is required in order to capture "peripheral" networks. For example, alters that exist outside the small intimate core network (Perry, Pescosolido, and Borgatti, 2018). To satisfy both the goals of the project and to compute accurate measures of network structure, an expansive approach to defining network boundaries using name generators was utilized. Name generators are more likely to contain weak ties, which serve important functions. Weak ties are often characterized by less intimate relationships, are not confined by local social-cultural environments, and are heterogeneous (Granovetter, 1973; Marsden and Campbell, 2012). Consequently, weak ties have the ability to transmit information about jobs and housing, for example. In this study, alters were not asked if they were connected to other alters. For a complete review of validity and reliability issues related to name generators, refer to Perry, Pescosolido, and Borgatti (2018).

To create subnetworks, the large and diverse network was divided into contextual subnetworks. Alters were extracted from the large HWR Charlotte network for analysis of family and friends for the study of mobility based on social interaction related to the following themes: (1) jobs or work, (2) housing, (3) health care (doctors, specialists, dentists), (4) child care (and or adult care), (5) college (education) and/or training (workforce, professional, vocational).

Collecting data about a substantial number of alters is necessary for computing accurate measures of network structure. Data was collected on all the alters by employing the name generator strategy and asking open-ended questions such as: "During the past 6 months, how many people have provided advice, information, resources, or help with important matters? Who are those people? Regarding the people you mentioned, what is your relationship with each?"

Pilot Testing

Pilot tests were used to evaluate how a sample of participants from areas of the city would respond to the questionnaire. They were conducted four weeks prior to the fielding of the questionnaire. Participants were recruited during earlier community meetings in two key demographic locations for face-to-face interviews. These interviews assessed potential differences within and across groups in the population. Based on this assessment, substantial changes to the questionnaire and procedures were made, and full implementation procedures were tested (e.g., recruitment, promotional materials, sign-up online event registration, prescreening protocol, remuneration process, Interviewer Consultant practice, etc.).

The pilot testing step provided opportunities for the Research Lead to evaluate closed-ended questions, such as the choice of options provided, how each option was described, the number of response choices offered and the order in which options were read. One example of the impact of how categories are defined can be found in the following question:

> Q37: Who are you in regular contact with or lives with you in your household and you DO NOT ask for advice and information about important matters?

Notes for the Interviewer Consultant were added to provide more instructions for example:

> *…ask about those people that they were in daily contact (minimum of one time per week) with but do not discuss important matters with. Ask for names or initials.).*

Closed-ended questions in the HWR questionnaire contained reasonable responses and the response categories did not overlap and were mutually exclusive.

Psychological research indicates that people have a difficult time keeping more than five choices in mind at one time, therefore the number of answer choices were kept to a relatively small number except in the few cases such as questions 123 and 136:

> Q123: Where do you volunteer?
>
> Q136: What do you attribute life's challenges to (before COVID-19)? These questions asked about an objective fact, where most participants had little trouble because they waited to hear their activities and challenges to respond.

Questions with ordinal response categories (e.g., excellent, good, fair, or poor) were presented in order so that participants could easily give responses along the continuum.

Question Wording

The choice of words and phrases in a question is critical in expressing the meaning and intent of the question to the participant and ensuring that all participants interpret the question the same way. Even small wording differences can substantially affect the answers people provide.

An example of a wording difference that would have had a significant impact on responses is illustrated below:

> Q128: Now that COVID-19 has occurred, what was your biggest challenge, frustration, or problem related to (1) jobs or work, (2) housing, (3) healthcare (doctors, specialists, dentists), (4) childcare and or adult care, (5) college (education) and or training (work force, professional, vocational)?

Adding additional questions, so that the respondent answered with a challenge for each area of focus, would have reduced ambiguity.

To address concerns regarding “acquiescence bias”, where participants differ in agreement regarding specific questions, the “agree-disagree” format question was limited in the questionnaire.

One other challenge in developing questionnaires is what is called “social desirability bias.” People have a natural tendency to be accepted and liked, and this may lead participants to

provide inaccurate answers to questions that deal with sensitive subjects. For example, several questions were included to ascertain the level of housing insecurity.

Question Order

Once the survey questions were developed, the question order was carefully considered and grouped by topic to unfold in a logical order. There are three sections to the questionnaire. The first section asks general questions. The second section asks about social relationships and contacts and the third and final section asks about changes experienced in one's life and one's beliefs, experiences, and perceptions. An interview script was developed and used for training. For example, Interviewer Consultants shared the following with each participant:

> *…For the second part of the interview, I am going to ask questions about people you trust to help you when you need it. For example, people you stay in regular contact with, other people you may not know very well or talk to every now and then, but you trust for advice, information, resources or discuss important matters with.*

Throughout the questionnaire design process, considerable attention was paid to keeping the questionnaire interesting and not overly burdensome to participants. Demographic questions such as income, education or age were asked near the beginning of the survey. The middle of the questionnaire contained the more interesting and engaging questions about personal network contacts.

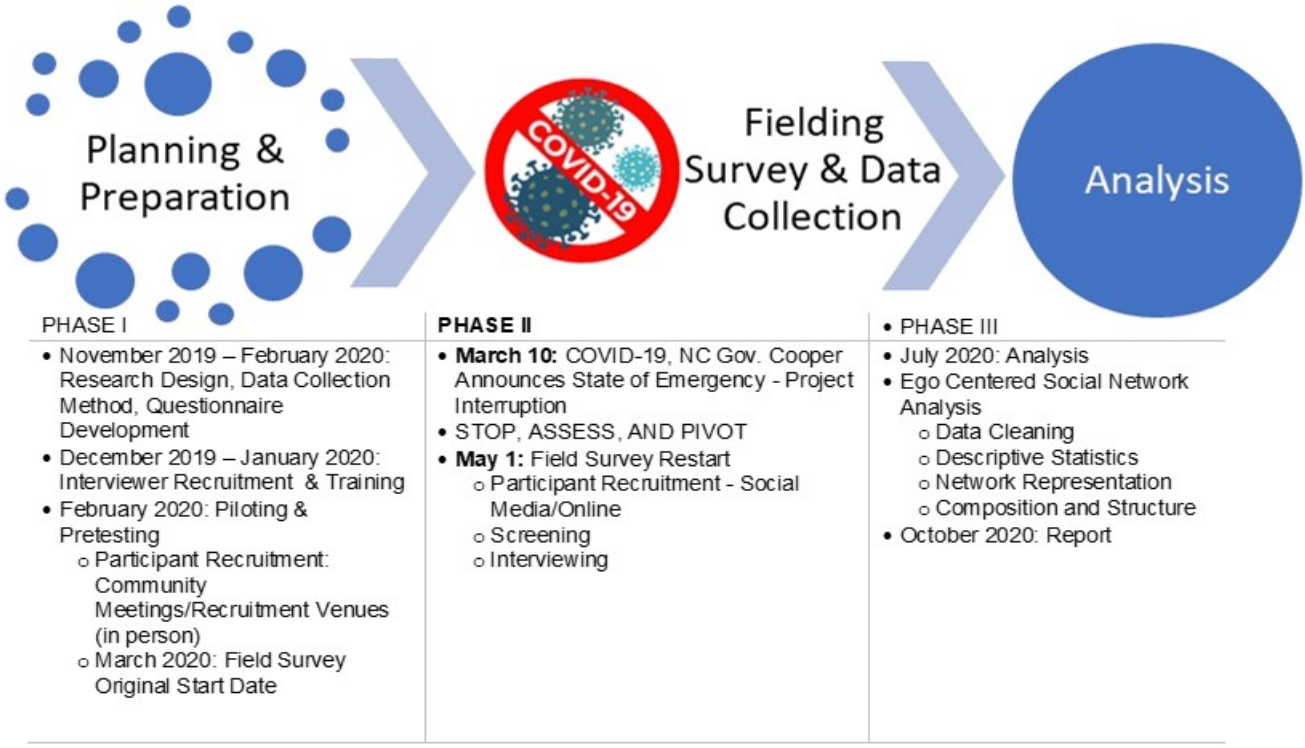


Figure 1: Project Timeline and COVID-19 Interruption. *This diagram illustrates the project phases and workflow process performed by the HWRCLT team.*

Community Meetings

Community meetings and activity venues in strategic locations in the city were used as pseudo focus groups to discuss the survey topics and recruit participants (Figure 1 identifies the timing when meetings and venue recruitment occurred). Community Liaisons gathered groups of potential participants to review the purpose of the HWR study and asked general questions regarding their perspectives and economic mobility in Charlotte. The Research Lead developed discussion guides and activities intended to introduce participants to the topic of personal networks. This approach provided participants with time to discuss network topics with Interviewer Consultants and other participants.

The community meetings were particularly helpful in gathering information while developing the questionnaire to identify important topics, how participants understand topic areas, and how they interpret questions (in particular, how framing questions in different ways might affect responses). The Interviewer Consultants assisted with facilitating the community meetings, leading activities, and documenting responses and feedback from the participants.

Results from the community meetings were not used to generalize to the broader population because responses provided in a group setting can be influenced by the opinions expressed by others in attendance. The total number of participants who attended was small (and not a randomly selected subset of the population).

Pretests

A pretest using a small sample of recruits was conducted following community meetings as part of the questionnaire development phase. The pretest was the most important assessment tool to determine whether participants interpreted the questions as intended and whether the order of questions influenced responses. It was conducted using the same protocol and setting planned for the field questionnaire (prior to the COVID-19 pandemic). Initially, the setting planned for one-on-one, face-to-face interviews in local high school classrooms and conference rooms provided by the Charlotte-Mecklenburg School System and Community in Schools. During the pretest, feedback from Interviewer Consultants regarding the questions and an estimate of how much time it takes participants to complete the questionnaire were assessed and considered for final revisions to the questionnaire design.

COVID-19 Pandemic and Virtual Setting Adoption

In March, the emergency announcements by Gov. Roy Cooper of North Carolina coincided with the launch of fielding the questionnaire. Qualitative research design during normal times is a complex and challenging process, but during a pandemic it is even more difficult. COVID-19 became a major epidemic event. In response to the sudden changes due to the pandemic, the HWRCLT team under the leadership of the principal investigator stopped, assessed, and pivoted. Changes were made regarding modality (administration of the study), participant recruitment, and questionnaire design. During the weeks that followed, the team switched from a face-to-face to a virtual approach to administering the questionnaire.

As a result of the pandemic, additional training was designed for the Interviewer Consultants. Training involved an overview of virtual technologies and implementation of a more humanizing approach informed by trauma-informed methods. The team was fortunate that two of the

Interviewer Consultants were licensed registered nurses, including a psychiatric nurse who assisted with incorporating humanizing approaches. For example, the team anticipated that many participants already had trauma histories separate from COVID-19. Interviewers were trained to consider the potential of trauma with compassion during interviewing. In addition, weekly mental health calls were conducted with the interviewers and the HWR team held meetings to identify possible signs of stress among team members.

Additional challenges included: (1) identifying and recruiting participants given that people were no longer congregating physically in groups at events that were previously targeted for recruitment and, (2) asking people for time to do interviews, given the new burdens placed on everyone by this pandemic. This moment required that the entire team learn new skill sets necessary to design and conduct valid, humanizing research online.

The HWRCLT team utilized an online scheduling event platform, online recruitment strategies, and an online screening process as part of its recruitment efforts prior to COVID-19. In response to the pandemic, the Marketing Leads designed a more robust social media recruitment effort. Additional efforts focused on partner development with local stakeholders, critical ad placement on a local online platform, securing an online event scheduler, and a strategic mail campaign informing potential respondents about the survey. As a result of the enhanced focus, the HWRCLT team successfully pivoted in response to the pandemic.

The team recognized issues of equity in relation to participant access. Recognition of participant access was critical to determining if choices were valid or created validity or ethical issues. One potential result from changing to an online platform was greater access to a wider range of participants, however, it is hard to know whether that was the case. It is unclear whether the most vulnerable in our community were unable to engage in this innovative research due to access. As a result, we will never know their stories and the findings from our research excludes their contributions.

Conducting a research study of this type during a pandemic created additional challenges regarding privacy and confidentiality (on both sides of the screen). These concerns were addressed and clarified by reviewing and enforcing informed consent, disclosure, confidentiality, and data security protocols.

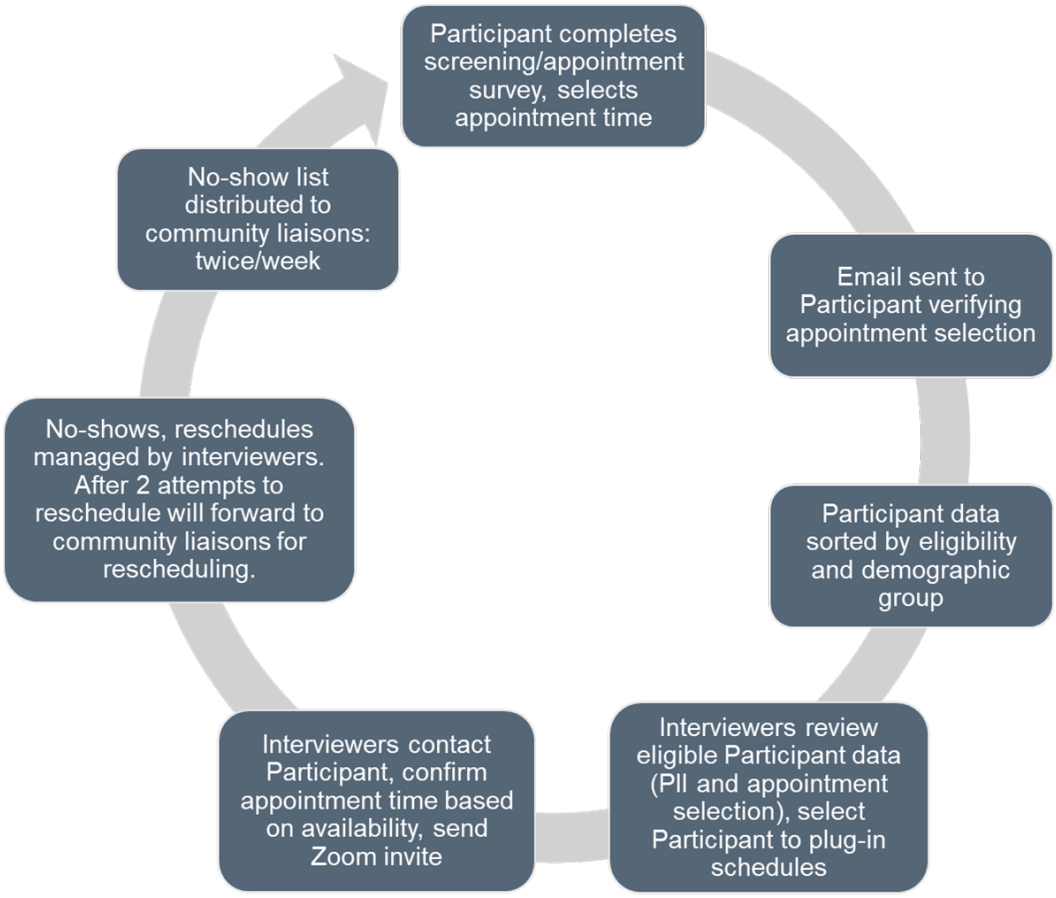


Figure 2: Participant Screening, Appointment and Workflow Diagram. *This diagram illustrates the participant screening, appointment and workflow process performed by the interviewers and community liaisons.*

V. Interviewer Consultant Training

Prior to the COVID-19 pandemic, a comprehensive Interviewer Consultant training manual was prepared, and three four-hour training sessions were conducted during January and February 2020. Interviewer Consultants were responsible for attending all community meetings, piloting/pretesting, as well as completing all required training. Following the COVID-19 changes in April 2020, Interviewer Consultants scheduled a minimum of five interviews based on sample completion targets per week. Interviewers often completed much more than the minimum, some as many as 15 interviews per week. Interviewers submitted weekly summaries of completed interviews, no shows, and rescheduled interviews. Figure 2 (above) illustrates the participant screening, appointment and workflow process performed by the interviewers and Community Liaisons.

VI. Participant Remuneration

Prior to COVID-19, $50 gift cards were awarded to participants individually upon completion of interviews at locations designated for piloting and pretesting (prior to fielding). After COVID-19 hit, the remuneration process was modified and involved a 3-step verification process:

1. Completed interviews were matched and validated against questionnaire completion data to remunerate participants weekly.
2. Weekly participant lists were approved by the Research Lead.
3. Brookings analyst, staff, and HWR Community Liaisons documented, communicated directly with participants, and maintained an efficient gift-card delivery process through spreadsheet maintenance, mailing physical gift cards, emailing virtual gift cards to participants, and verifying delivery.

VII. Data Collection

Data collection occurred from May 1 to July 6, 2020. Data collected included information about the individual characteristics of the contacts using multiple name generator strategies:

> Q46: What are the age, gender, race, and ethnicity of the 5 people you discuss matters related to jobs or work with?
>
> Q47: Who do you stay in regular contact with? Who do you talk to every now and then, only when needed?
>
> Q48: For the 5 people you discuss matters related to jobs or work, how do you know ___ ? And how did you meet ___?
>
> Q49: What neighborhood in Charlotte does ____ live?

Demographic data, including information on age, gender, race/ethnicity, relationship status, education, income, and employment status, were collected. Additional contextual information gathered included: transportation options, internet access, home ownership, where parents were born, language spoken at home, health insurance status, mental and physical well-being, volunteer activities, and general attitudes and perceptions about living in Charlotte.

Race/Ethnicity

For this study, race and ethnicity were defined separately and question development followed the standards set forth by the Office of Management and Budget (OMB) standards (National Institutes of Health, and U.S. Department of Health and Human Services, 2015) [NIH] which guide the Department of Health and Human Services (HHS) and the U.S. census. Therefore, an individual's response to the race question is based upon self-identification. The HWRCLT team followed the practices described therein and interviewers did not tell individuals which racial group to select. Participants were also presented with the option to self-identify with more than one race when asked: "What race do you identify with most?" Additional answer choices—"other, biracial, and multiracial"—were presented for participants who identified with more than one race.

As described in NIH (2015), the OMB requires five minimum race categories and two categories for ethnicity. The race categories are: American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander. The HWRCLT study included 17 race categories (not including multiple race). According to standard practice, two categories for ethnicity were presented: "Hispanic or Latino" and "Not Hispanic or Latino" in the ethnicity question: “Are you of Hispanic, Latino, or Spanish origin?” Figure 3 (below) shows the process for assigning the participant’s race/ethnicity based on their responses.

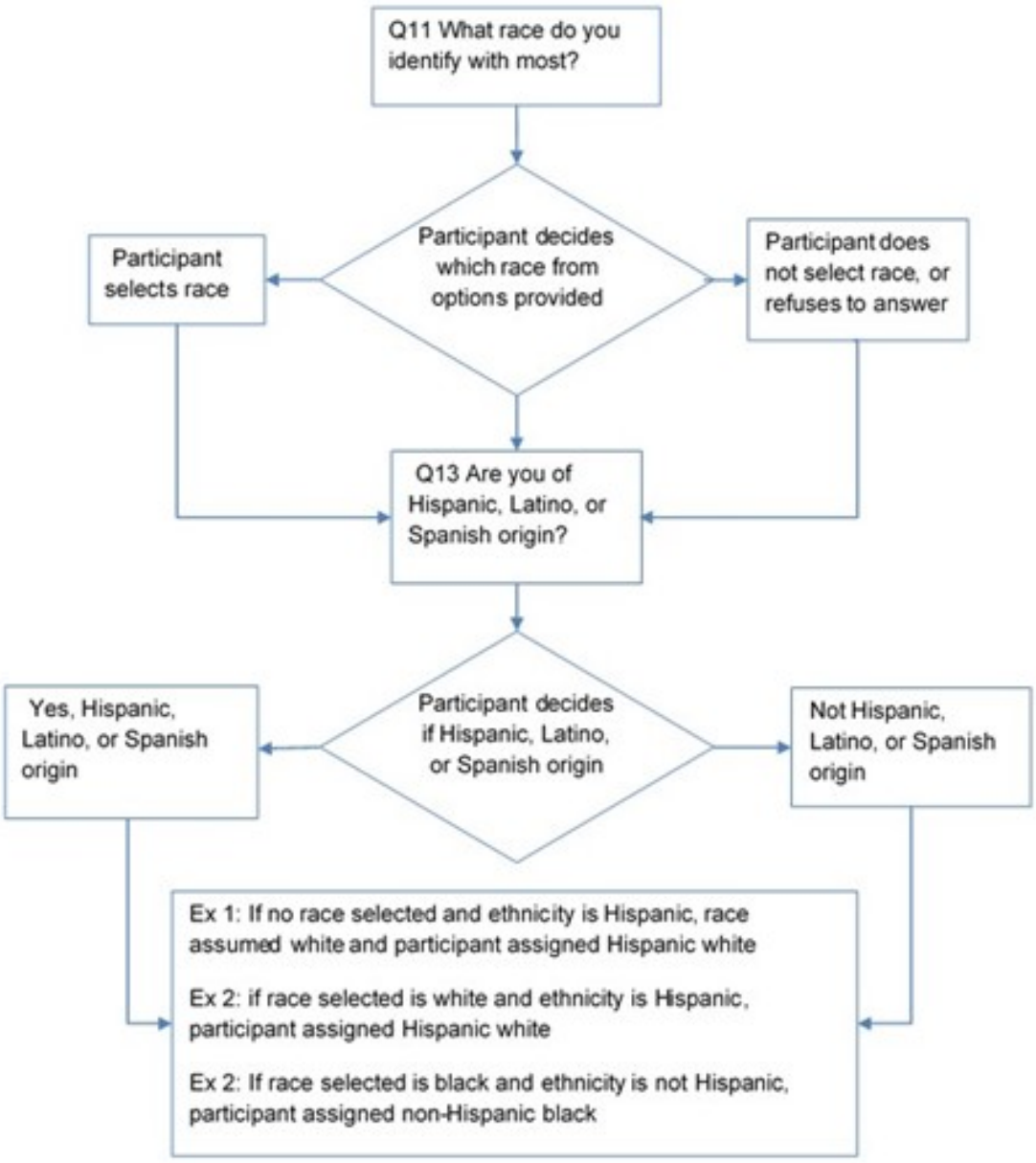


Figure 3: Race/Ethnicity Decision Process. *This diagram shows the process followed for determining the race/ethnicity of participants based on answers to questions 11 and 13.*

Exclusionary Criteria

In the HWRCLT study, the inclusion criteria related to demographic characteristics (≥21 years of age, male or female gender, non-Hispanic Black, white, Hispanic race/ethnicity, and income). Exclusion criteria related to length of residency (more than six months) and whether they receive advice, information, and/or resources from anyone regarding important matters, which would limit the ability of the participant to participate in the study.

Keep in mind that the network structural characteristics of social contacts can only be studied using personal network data. Personal networks are the most accurate way to operationalize and measure the composition and structure of social contacts. Therefore, personal networks were collected to distinguish variation among participant attributes.

Nonresponse and Response Rate

At least three attempts were made to complete an interview following an initial Zoom meeting invitation. The calls were staggered throughout the day and days of the week (including at least one evening call) to maximize the chances of contacting a potential participant. Interviewing was also spread as evenly as possible across the field period. An effort was made to recontact most interview breakoffs and refusals to attempt to convert them to completed interviews. Response rates for How We Rise averaged 58% and were comparable to those for other major opinion polls. The response rate is the percentage of participants for which a completed interview was obtained.

Name Generators

The most common method of generating data on ego-centered personal networks is to ask study participants questions about their contacts. We followed the General Social Survey (GSS) approach by the classical study by Burt (1984) and made modifications to create the How We Rise questionnaire. The specific items from the General Social Survey (GSS) have been widely used by researchers in social science.

The social relationship module contained two sections: questions about (1) the long list of participant's social relationships, and (2) the short list of participant's social relationships, the top five most important contacts that participants ask for advice, etc. for each theme.

Themes related to social and economic mobility are: (1) jobs or work, (2) housing, (3) healthcare (doctors, specialists, dentists), (4) childcare (and or adult care), (5) college (education) and or training (workforce, professional, vocational).

The first question was intended to stimulate participant thinking regarding their relationships. For the next set of questions, the participant was asked to name people they get advice, etc. from, otherwise known as the *long list*. After asking about their general relationships, participants were asked questions about their *top five* most important contacts.

It was not the intent of the study to capture whether alters knew other alters (if participant contacts knew each other) and questions were not designed to inquire about alter relationships with other alters. Our objective was to collect information about a participant's relationship with his/her contacts.

Resource Generator

After gathering the long list and the top five from participants, a series of questions called resource generators were used to assess the diversity of different kinds of social support accessible through ego-centered social networks. For each theme, participants were asked a resource interpreter question (see Table 2).

Specific types of support were measured directly. Contained in Table 2 are the various forms of social support that were presented to the participant.

Table 2: Advice, information, and/or resources received from contacts regarding important matters. *This table shows the various forms of support received by participants from personal network contacts.*

Various Forms of Support from Personal Network Contacts		
Construct	Definition	Application
Instrumental	Tangible aid and service	Connected you to; provided economic resources, financial assistance. Helped you navigate issues, challenges Mentored; advised, trained you. Referred you to education/ training/ skills development, work placement, internships. Reference for job.
Informational	Advice, suggestions, and information	Provided information, leads; knowledge, expertise about programs/services; opportunities. Networked, connected, referred you to others with knowledge, expertise about programs /services; opportunities.

The key benefits of the resource generator approach are that it measures social capital via support in a population regardless of theme or domain and does so efficiently by specifying what kind of support helps the participant with important matters (Perry, Pescosolido, and Borgatti, 2018). The measurement of the role of the person through whom a form of support is received captures relative access, as well as the potential benefit. For example, a father is probably more likely to provide a particular form of support concerning housing. However, having strong ties may not be as helpful when it comes to jobs as would an acquaintance at work (Granovetter, 1973).

Name Interpreters

After eliciting the list of contacts (alters) from participants, questions called name interpreters are asked about the alters. Name interpreters are flexible and can be used with name and resource generators. This data collection approach is ideal for gathering data about the alters and the ties. This approach allows the team to compute a variety of measures of ego centered social network composition and structure (see data analysis).

Name interpreters are questions asked about the alters given through name generators (when participants name their contacts and the roles). Combined with name generators, name interpreters provide data about alters' characteristics, relationship properties and support received by egos. Characteristics gathered about alters can be used to determine the content of the network composition and structure, such as tie strength and function. Contained in Table 3 are questions that served as name generators, interpreters; and definitions of structural measures adapted from Perry, Pescosolido, and Borgatti (2018).

Table 3: Generators, Interpreters and Measures. *This table shows the questions in the Social Network Module that collect data used to compute various measures of ego centered social networks.*

Generators, Interpreter and Construct Operationalization

Question	Type of Generator	Measure	Definition
During the past 6 months, how many people have provided advice, information, resources, or help with important matters? Who are those people? (*long list*)	Name Generator	Structure	Presence and pattern of ties between ego and alters in social network
		Role	Type of connection
Regarding the people you mentioned, what is your relationship with each? Let's start with the first person...	Name interpreters	Role	Type of connection
Who are the 5 people you discuss important matters related to [theme]? (*top 5*)	Name Generator	Structure	Presence and pattern of ties between ego and alters in social network
		Role	Type of connection
		(Tie) Strength	Indicator of intensity and occurrence of the relationship between ego and alter

		Function	Form of support provided through ties to ego
"What is the age, gender, race, and ethnicity of the 5 people you discuss matters related to [theme]?	Name interpreters	Content of ties, composition of network Heterogeneity	Sociodemographic characteristics of alter that can be used to provide insight into ego's access to resources that lead to mobility
Who do you stay in regular contact with?	Name interpreters	(Tie) Strength	Indicator of intensity and occurrence of the relationship between ego and alter
Who do you talk to every now and then, only when needed?	Name interpreters	(Tie) Strength	Indicator of intensity and occurrence of the relationship between ego and alter
For the 5 people you discuss matters related to [theme], how do you know ___ ? And how did you meet ___?	Name interpreters	Formation	Indicator of how and when ties were formed between ego and alter
What neighborhood in Charlotte does ____ live?	Name interpreters	Spatial Pattern	Indication of where different ties are located within the city, interaction between ego and alter; and underlying characteristics of the city
Has ____ performed any of the following related to [theme]?	Resource generator	Function	Form of support provided through ties to ego

A fairly standard set of name interpreters were used in this study and are typical of ego-centered network studies. Interpreters are used to obtain data on tie strength and the function of relationships embedded in the ego-centered social networks. Strength is an important measure in egocentric research, and captures the intensity, frequency of ties between an ego and alters within the networks.

Another way to define tie strength is by closeness, frequency of contact, and commitment to providing resources when needed (see Table 3). Also, worth noting is that the presence of "weak" ties (which can be characterized by less frequent contact) can indicate access to novel

resources (Granovetter, 1973). An important advantage of collecting information about tie strength is that these variables are indicators of a range of socioeconomic and cultural outcomes (Perry, Pescosolido, and Borgatti, 2018).

The name interpreters used in this study also collect data about the function of ties–or types of support (see Table 3). Network function is defined as a measure of what and how much alters provide support to egos according to the context (or theme). Function can also refer to the different types of relationships that alters have with egos based on normative functions (e.g. parent, co-worker, friend).

Name interpreters raise concerns such as nonrandom error in network data which occurs when only one person provides the data on behalf of the other. However, this is less of a concern because the focus of the study is on ego's perceptions and social processes that may facilitate or hinder social mobility. In addition, participant's perceptions of their relationships are usually more accurate because perceptions are based on their experience.

VIII. Analyses

This section focuses on the procedures used to perform the quantitative ego-centered social network analysis. The section is organized into four broad sections based on procedures. The process is also illustrated in Figure 4 below. The steps are as follows:

1. Data cleaning
    a. HWRCLT ego-centered network representation (visualization of network data)
    b. Data management and storage – adjacency matrix
2. Role assignment
3. Aggregation (transition to role-based networks)
4. Network composition and structure
    a. Similarity, homophily, heterogeneity
    b. Average weighted degree
    c. Tie strength (transformation for comparative and conditional analysis)
    d. Tie formation
    e. Spatial distribution

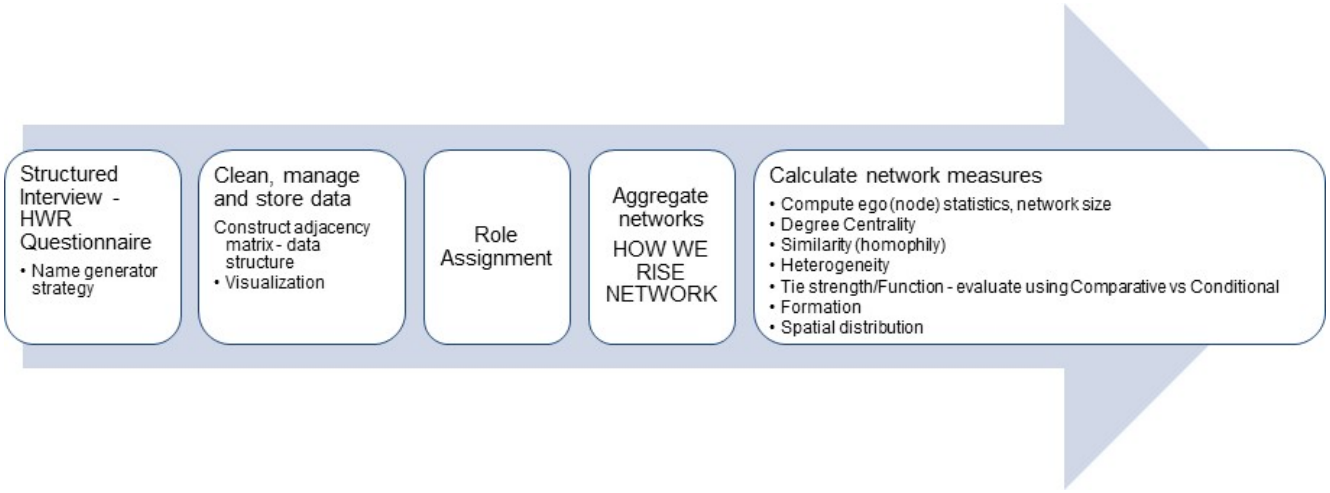


Figure 4: HOW WE RISE Ego Centered Network Analysis.

Step 1: Data Cleaning

Data preparation consisted of three main steps—data collection, data cleaning, and data transformation—each of which had its own set of challenges. Personal ego-centered network data is dynamic, noisy, and messy in nature, which challenges analysis tasks, efficiency, and accuracy. The ego-centered network data preparation step deserved special attention as it underpins all subsequent analysis.

The first task was ensuring each participant's ego-centric network edges were correct, complete, and not redundant. Names were often missing, spellings were different, and multiple parties had the same names, thus requiring these items to be cross-checked.

The raw data (once cleaned) was then transformed into an adjacency matrix structure for data analysis tasks. Answers to the social network questions were used to construct an adjacent matrix representing the personal ego-centered networks sampled for this study. The network data collected from 177 subjects studied enabled the construction of over 1,400 social relational results that constitute over 30,000 network configurations.

How We Rise Ego-Centered Network Representation

In general, a personal ego-centered network is a set of nodes joined by some relation. Nodes can be persons, groups, organization, or entities. This study represents Charlotte as a network of residents linked through social ties (connections). Study participants (egos) have social ties to their contacts (alters), and receive various types of support related to five themes of social interaction that we argue are instrumental to socioeconomic mobility: (1) jobs or work, (2) housing, (3) health care (doctors, specialists, dentists), (4) child care (and/or adult care), (5) college (education) and or training (workforce, professional, vocational).

For this study, we constructed a representative personal network matrix where two alters were considered linked if they were discussed by the participants (egos). The data is generated using the name generator strategy. We collapsed the participant networks into five unweighted networks based on the five themes of social interaction.

Star Network

The name generator strategy creates either: a hub-and-spoke network or a "star" network (see Figure 5), or a bimodal network. All connections between nodes were between one central node (the participant interviewed) and the contacts they provided information about. We have no information about how or if the alters knew each other or interacted (which constrains our analysis).

Figure 5: Star Network. *The node in the center represents the participant (ego) and the surrounding nodes (alters) represent contacts.*

Step 2: Role Assignment

Each participant's ego-centric network was constructed by creating a tie between individuals for each topic area. The nodes were reclassified according to the role that person represented in the ego-centric network. Ties were aggregated (i.e., tie counts were aggregated) which required an incredible amount of computation time (3-4 weeks), including cross-checking with interviewers.

When someone served the same function across topic areas, a tie was formed between individuals that served the same function, connecting their roles. In all, 177 ego-centric networks were created and alter names were replaced with their role. Within each network, a tie was formed between alters when they shared the same role. During the role assignment, additional edges were created to connect alters that shared the same role and provided functional support for each theme discussed. All 177 networks were aggregated to determine the functional strength of all the roles across all the participants.

Each participant was assigned a unique ID number to identify the participant characteristics and connected alters. The node ID allows the analyst to preserve all the information about the participant and individuals so that subgraphs could be analyzed by participant characteristics and by the network connections they described.

For more details for ego-centric analysis and transitions to role-based networks, textbooks by Perry, Pescosolido, and Borgatti (2018) and Newman (2018) are excellent resources.

Step 3: Aggregation (Transition to Role-Based Networks)

To generate statistical information, we aggregated all the network graphs from each individual into a single, large network to compute the network measures and perform network analysis. We aggregated ties across surveys, shifting from an ego-centered network to a role network. During the aggregation step, we cleaned the graph by removing any roles participants did not interact with.

Figure 6 illustrates the aggregation process. Panel A represents the before case where the participant (the ego) is in the center with surrounding nodes (alters) and the contacts that were named during the interview. Panel B represents the after case, where the ego is removed during the aggregation of all the ego networks. The participant provides no differentiable information (similar to multiplying a vector by one) and removal does not change the size, direction of the network, or the ties. No information is lost by removing the ego.

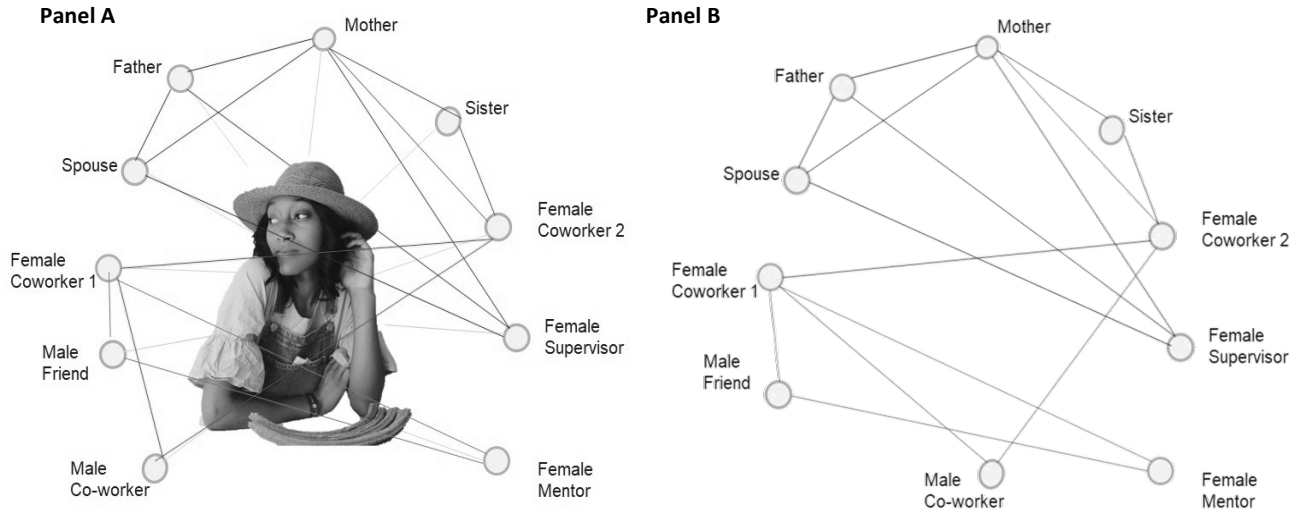


Figure 6: The Aggregation Process. *Panel A contains the ego. Panel B illustrates the network with the ego removed.*

Once this step is completed, analysis can be performed on the entire network, or the network can be "partitioned" to reveal differences in social structures and relationships. We partitioned the aggregated network to perform comparative and conditional analysis (see Step 4) across partitions based on:

- Any characteristics of the interview subject, such as age, gender, race/ethnicity, and income
- Type of interaction or benefit (various types of support) provided
- Type of Topic: COVID-19, housing, job, health care, child care, etc.

Preliminary Network Analysis

Exploratory data analysis was performed by computing summary statistics on survey questions and by each categorical cross section, e.g., race, gender, age, income, and education.

Descriptive analysis, visualizations, and analysis of variance (ANOVA) provided a baseline for where to focus our efforts. Histograms by categorical cross sections, charts, and graphs were created for visual inspection to see where visual differences existed.

To determine whether there were any statistically significant differences between the means of various role pairs, we performed ANOVA—a statistical method used to test differences between two or more means, and the most commonly used technique for comparing means. When the null hypothesis is rejected, we conclude that at least one population mean is different from at least one other mean. However, since the ANOVA does not reveal which means are different from which, we also performed the Tukey HSD test. The Tukey HSD test assesses all pairwise comparisons among means. The test is based on the "studentized range distribution." Statistical tests revealed significant differences in strength of network contacts. Results are discussed in the Analysis of Results section and output featured in Appendix A.

The preliminary network analysis is as follows:

- There was no discernible difference by gender.
- Younger people asked advice from more people.
- Older people had a much smaller set of people that they engaged with.
- Participants with higher incomes connected to more people.

The detailed results for the demographic cross-sectional groups are provided in the Analysis of Results section.

Step 4: Network Composition and Structure

Network structure is defined as the pattern of ties between participants and their connections. Many different measures of network structure can be computed using information on ego-alter ties and alter-alter ties.

This step involves computing measures for determining the compositional structure. One of the most important measures is degree centrality, which identifies the most important node in the network and is computed using information on the ego-alter ties. The degree of a node is defined as the number of ties connected to it. Degree distribution is a defining characteristic of network structure.

Average Weighted Degree

We computed the average weighted degree by considering each participant's (r), or the node's allocable weights. The apportionable weights can be defined as the reallocation of strength s_i, which corresponds to a node's actual advice, information, or resource.

$$r_i = \frac{s_i}{k_i} (= r_i)$$

Here, K_i is the degree of node i, which is defined as the total number of contact ties connected to it, i.e.,

$$k_i = \sum_j a_{ij}$$

and s_i is the strength of node i, which is defined as the sum of the weights of all the ties connected to it, namely,

$$s_i = \sum_j w_{ij}$$

(Amano, Ogawa, and Miyake, 2018; Perry, Pescosolido, and Borgatti, 2018; Newman, 2018).

Similarity – Homophily and Heterogeneity

There are various ways to describe the kinds of contacts participants have in their networks, including diversity. A central concept in social network analysis is similarity. Similarity can be described using measures such as homophily and heterogeneity. For example, which nodes in a given network are most similar to one another and how can we quantify them? This question helps us understand the types of relationships that exist within networks.

In general, similarity describes the proportion of the network that is the same as the ego. Homophily measures if participants build relationships with others like them. Heterogeneity measures if participants have access to non-redundant social resources (Perry, Pescosolido, and Borgatti, 2018; Newman, 2018). Proportions were used to determine homophily and the Herfindahl–Hirschman Index to assess heterogeneity. We applied these measures to the HWRCLT network data to determine what networks look like in Charlotte because reoccurring patterns in network structures have a profound effect on the way the system operates.

Strength – Comparative vs. Conditional

The strength of ties captures the intensity and duration of connections between participants and their contacts as well as the frequency of occurrence (Perry, Pescosolido, and Borgatti,]2018). This measure also reflects the content of the network and resources present. Assessing the content of an ego network is a fundamental task.

Strength is defined as the standard normal statistical transformation of the node degree. Social roles, i.e. nodes, are linked by the function they perform and the number of ties on each role constitutes its degree. We took the average degree for each role across all participants in a demographic group, then applied a standard normal ($\mu=0$, $\sigma=1$) transformation of the degree value. This converts the average weighted degree to a standardized Z score allowing for comparison across social roles and demographic groups.

Networks were analyzed using two distinct perspectives: (1) comparative, or across demographic groups, and (2) conditional, or within demographic cross-sectional groups. In both sets of analysis, a standard normal transformation was performed using the average degree by role of the aggregated network edges. This allowed for a unit-free comparison across networks of different size.

The comparative analysis provides a measure of the relative strength of different roles across a population and how they vary across different demographic groups. Whereas the conditional analysis examines the relative strength of roles within the community. The difference is subtle but quite different. The relative strength across population is different than strength within a community. Further clarification is provided below.

Comparative Plots

Comparative plots compare the relative strength (based on the average degree of network ties) across different demographic groups. These Z scores are based on all the edges in the overall network graph. This allows us to compare the strength of the network relationships for each role and function. For example, if we want to know if Black men have relatively stronger ties to say their fathers, then this comparative plot (because it is a scale free comparison relative to all other groups) allows us to do that.

The response choices for the network questions allow us to further define the types of functional support provided:

- Economic/Financial Functions (green for Financial)
- Training/Mentoring (blue for Financial)
- Organizations/Resources (yellow gold for Financial)

There were 509 plots contained in the comparative plots for all demographic groups. Contained in Appendix B are selected roles and functions by gender and race of the participant. Figure 7 illustrates the role of fathers and Figure 8 illustrates the role of female co-workers.

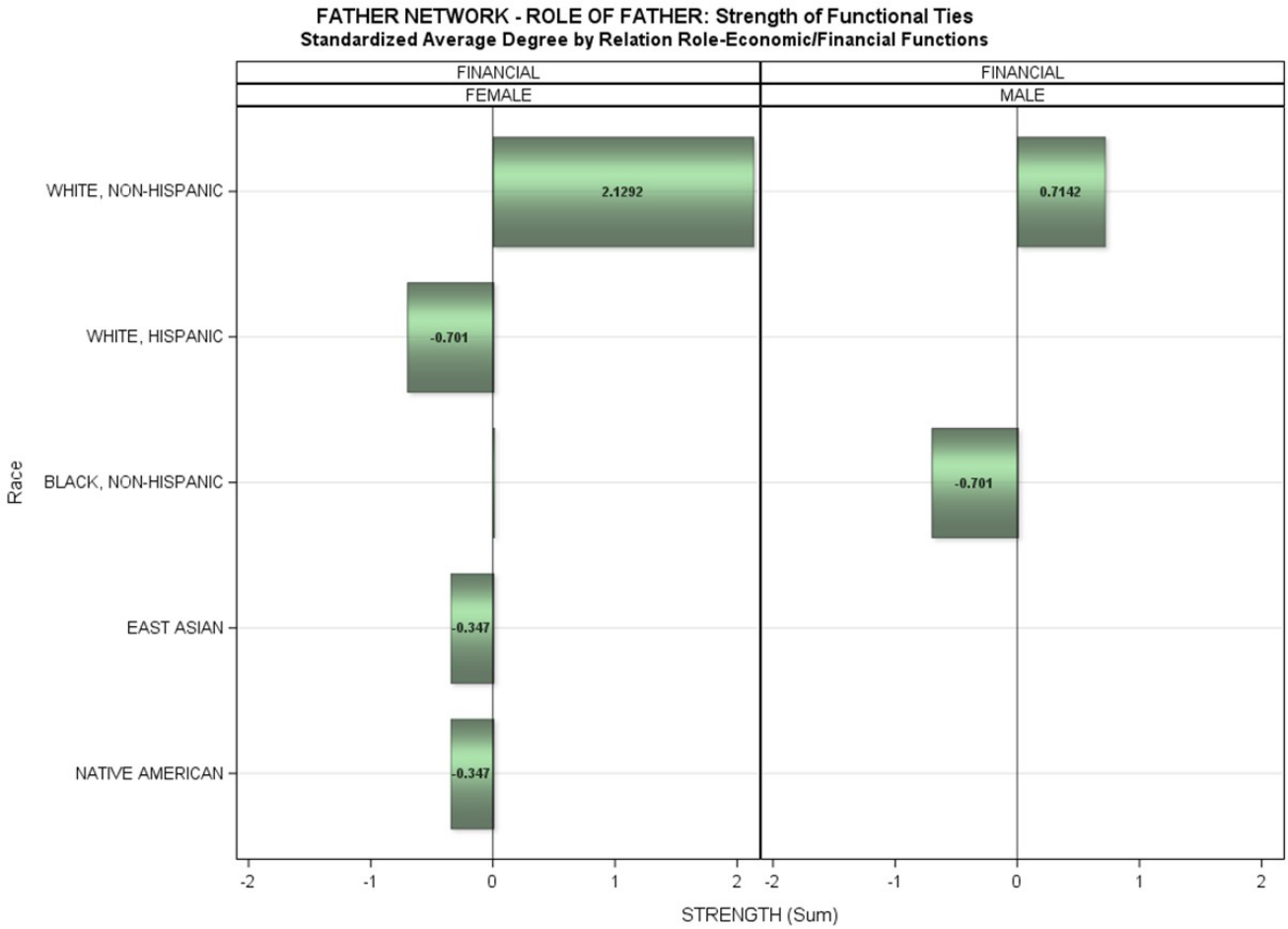


Figure 7: Role of father and the strength of functional ties. *This figure highlights and compare the relative strength (based on the average degree of network edges) across different demographic groups.*

Conditional Plots

Conditional plots consider the strength of the tie within a subpopulation. We condition on a subgroup, meaning we partition a subset of the data and calculate the Z scores only within that group. This statistical difference of conditioning on a sub-graph (i.e., a subset of the network) allows us to ask a different question about the strength of the relationship. For example, within

the population of Black males, which tie is the strongest for each function? The difference may seem subtle, but it is in fact quite different.

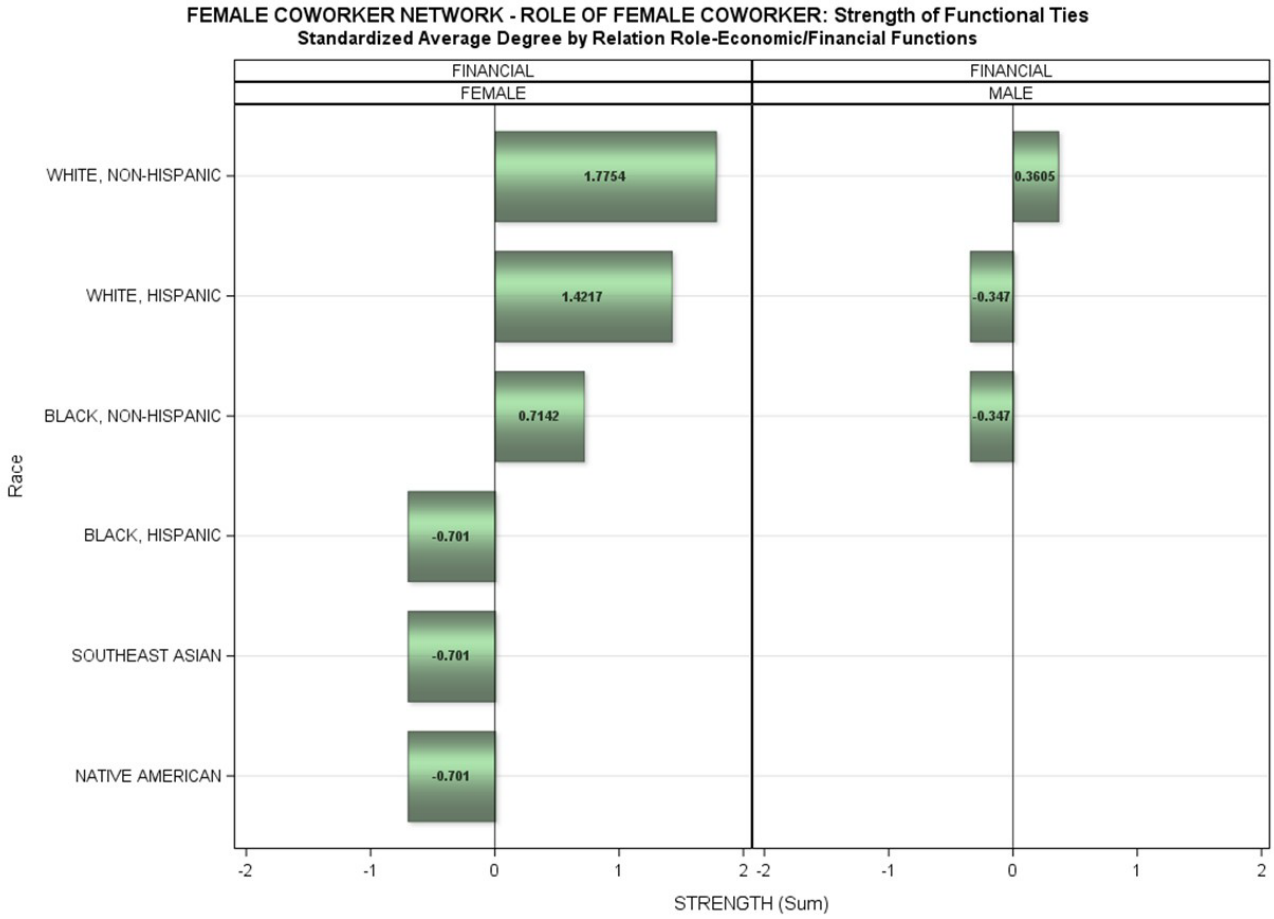


Figure 8: Role of Female Co-Worker and the Strength of Functional Ties. *This figure highlights and compare the relative strength (based on the average degree of network edges) across different demographic groups.*

Network Formation

We argue that relationships play a role in social and economic mobility. For example, contacts play a critical role in obtaining information about jobs (Granovetter, 1973). Therefore, it is essential to explore how network structures form. Network formation refers to how the participants met their social contacts.

Formation is reported for each demographic cross section and selected results are featured in the Analysis of Results section. The relative frequencies of tie formation were computed. The proportion of each social role is represented by the size of the boxes in the column on the left. The proportion of how the social contact was formed is illustrated through the size of the boxes in the column on the right. The flows between a particular social role and how a contact was initiated is illustrated by the proportional flows between the boxes in the respective columns.

Spatial Dimensions of Personal Networks

We argue that it is important to understand the networks of local social relationships and that includes understanding the patterns of social contacts in Charlotte. We were compelled to explore the spatial patterns of participant ties between their social contacts. We believe there is a need to understand the spatial variation in network patterns. While we did not specifically incorporate spatial effects–or a spatial model to formalize the influence of how neighboring areas affect social mobility in Charlotte, a spatial weights matrix was constructed, a key element in identifying the way that "influence" matters in spatial regression models.

Where geographic information was available, we aggregated all the participants and assigned spatial weights, representing the ties between participants and contacts (the green lines) on the map connecting the nodes (Rey, Arribas-Bel, Wolf, 2020). Address information is considered confidential and is therefore not released or shared with others. We used a geographic masking technique to protect confidentiality and location data was not used (e.g., roads, neighborhood names, etc.). For a more complete review regarding spatial modeling, review research by Tita and Radil, (2011); Sampson and Sharkey (2008), and Leenders, (2002).

To summarize, we took a quantitative approach to performing an ego-centered network analysis by applying mathematical and statistical techniques. We performed statistical and quantitative network analysis. Totals, means, and standard deviations (SDs) were used to characterize the nodes. Nodal statistics were generated, measures of similarity (homophily and heterogeneity), the comparative and conditional probability of tie strength, the relative frequencies of tie formation (how participants and contacts met), and spatial distribution of personal networks. The graphical presentation of the key findings is contained in the Analysis of Results section.

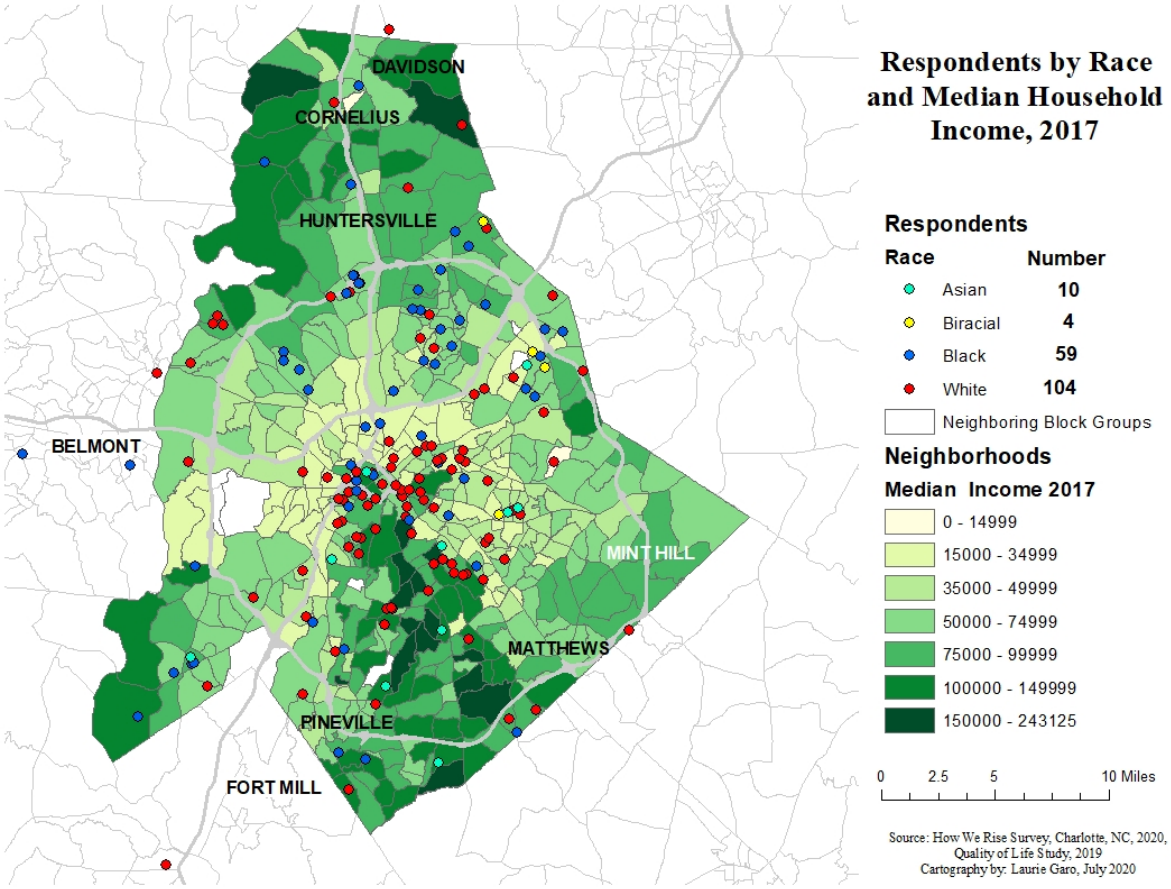
Network analyses were performed using SAS statistical analysis software. All network visualizations were created using the Gephi Open Graph Viz Platform. The alluvial diagrams were created using version R Package. Maps were created using Esri's ArcGIS geographic information system (GIS).

VIII. Results

Sociodemographic Characteristics of Study Participants

Map 1 features the spatial variation of the study participants by race and neighborhood median household income (Census 2017). We completed a total of 216 interviews. After removing interviews with 60% missing responses, the final study sample represented n=177 participants and were included in the analysis. The sample has strong external validity in relationship to the target population. Of the participants who participated in the study, 60% were women as compared to 52%, the total percentage of women who lived in Charlotte. Approximately 42% of the participants were male (the difference representing nonbinary gender identification) to 47% in Charlotte. The study attracted more younger women (aged 21-39) than men as well as older age groups as compared to the total represented in Charlotte. The distribution of income among study participants was close to the distribution of income in Charlotte. Over 50% of the

participants earned between $35,000 and $75,000. The racial composition mirrored the percentage of racial composition in Charlotte among Hispanics (13%), non-Hispanic whites (45%) and non-Hispanic Blacks (35%).



Map 1: Spatial variation of study participants. *This map features the spatial variation of the study participants by race and neighborhood median household income (Census 2017).*

Node Statistics

Gender

The maximum network size for female participants was higher (22) than males (17). On average, males had 8.48 nodes compared to 7.65 nodes for females. The largest networks were COVID-19 for both females and males.

Educational Attainment

Study participants with bachelor's and graduate degrees had higher maximum network sizes of 20 and 21, respectively. On average, participants with bachelor's degrees had 8.04 nodes compared to 7.89 nodes for participants with graduate degrees. Overall COVID-19 and Jobs were the largest networks.

Race/Ethnicity

White non-Hispanic and white Hispanic participants' maximum network size was slightly higher (22) than Black non-Hispanic (20). On average white, non-Hispanic and white Hispanic had 8.15 nodes and 8.12 respectively compared to Black non-Hispanic with networks containing 7.78-8.0 nodes.

Age

The 21-29-year-old age group had the highest maximum network size of 22. On average, 40-49-year-olds had 9.09 nodes. The age group with the smallest number of members in their networks were 60-69-year-olds with 6.33 nodes.

Current Employment Status

Participants employed full-time had the highest maximum network size of 22. While participants that were unemployed (not looking) had a maximum network size of 10 nodes. On average, participants employed full-time had 8.22 nodes compared to participants unemployed (not looking) with networks containing 9.0 nodes. Jobs and Education were the largest networks if the participant was unemployed (not looking) and a student.

Network Size by Theme

The social relationship module section contains questions where the participants were asked to estimate the number of contacts that provided advice, information, or resources, followed with a series of questions that asked the participant to name their top five most important contacts for each theme. Figure 9 suggests that study participants tend to underestimate the actual named contacts and the size of their social network overall. For example, the actual estimate based on contacts cited for the Jobs network was, on average, 2.87, compared to the initial estimation of 3.15 contacts.

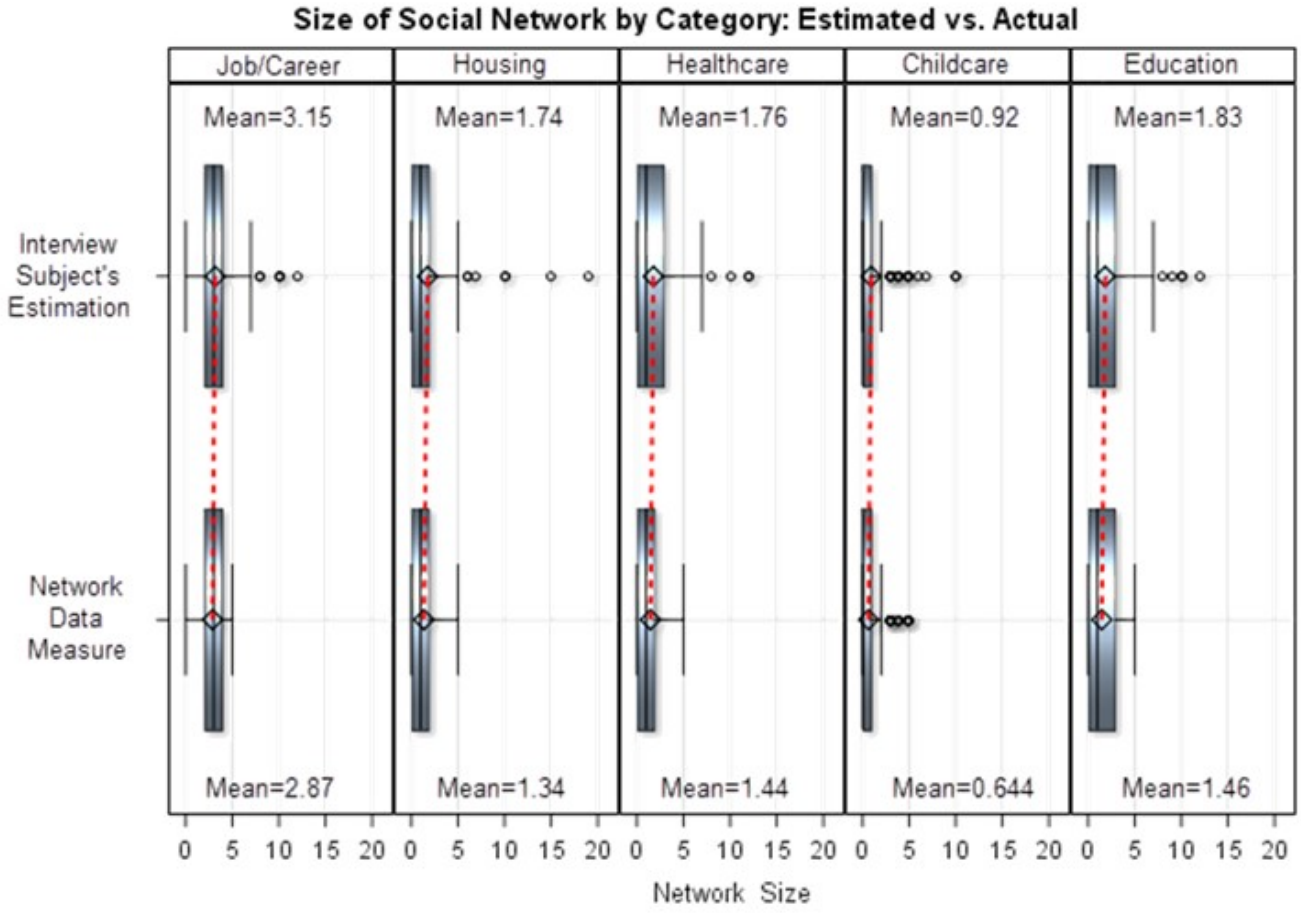


Figure 9: Size of Social Network by Category. *This figure shows the distribution of all the participant networks in the study where 50% of networks = 1.0 and not diverse.*

Homophily (How Similar Are Network Members to the Participant)

If the participant was in the 40-59-year-old group, half of their network was the same age group; this was less so for participants in the 30-39-year-old age group. Among the 21-29-year-old age group, 75% of personal/social networks were the same age group. Study participants who were in the 60-69-year-old age group had the most diverse network members in terms of age, with 30%-50% in the same age group. Regarding gender, female networks contained mostly females and male networks have slightly more gender diversity. With respect to race, networks were predominantly made up of the same race with mostly non-Hispanic whites.

To help capture the diversity of networks, we utilized the Herfindahl–Hirschman Index (HHI), discussed in the subsection regarding similarity on p. 35). The HHI, which is measure of concentration, considers the relative size of the distribution of the networks in the study where 0=perfectly diverse and 1=perfectly ”not” diverse. Figure 10 shows the distribution of all the participant networks in the study. Overall, the Herfindahl analysis revealed that 50% of the networks were not diverse. The distribution of racial diversity indicates that non-Hispanic white

networks were the least diverse, with 60% with a value equal to 1, whereas 40% of non-Hispanic Black networks had a value equal to 1.

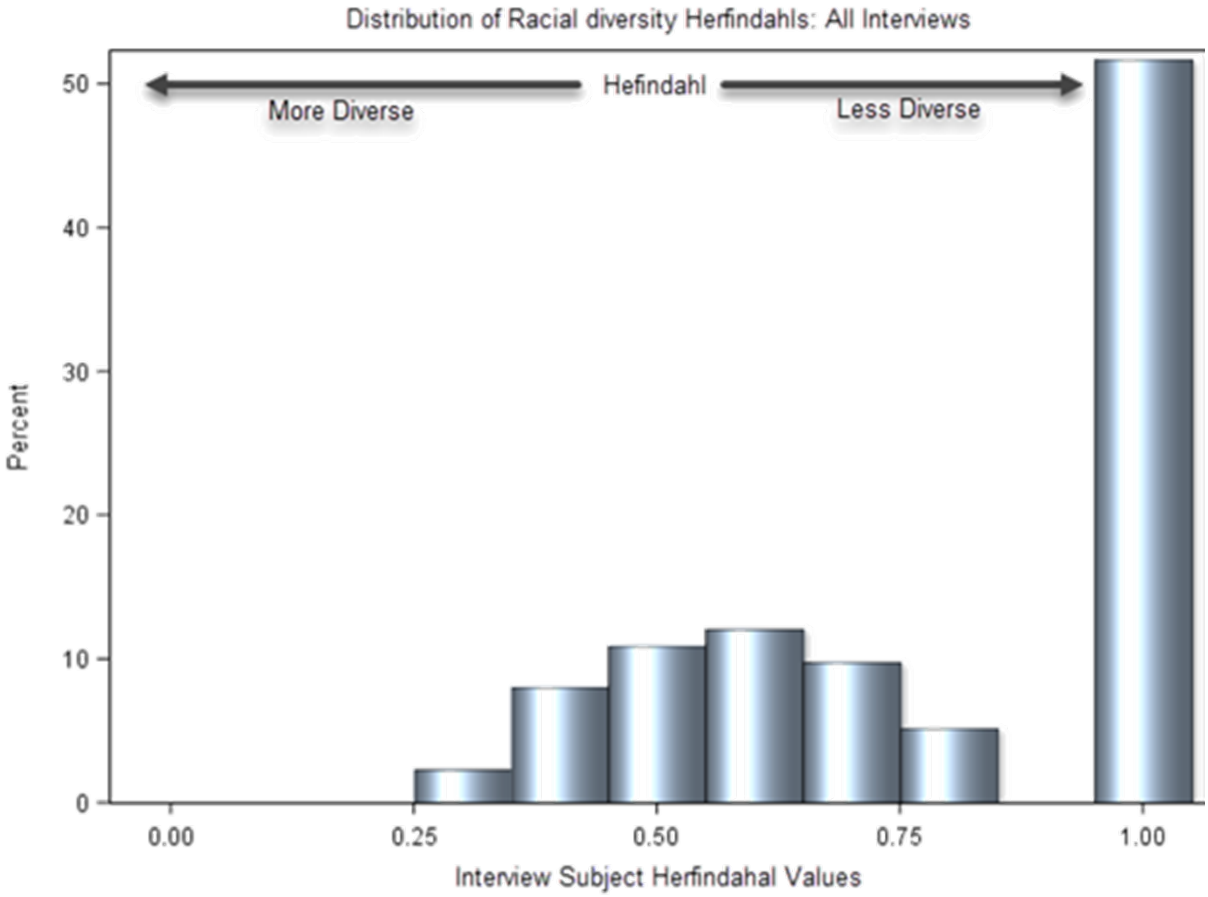


Figure 10: Distribution of Racial Diversity. *This figure shows the distribution of all the participant networks in the study where 50% of networks Herfindahl value = 1.0 and not diverse*.

Role and Network Function – Comparative vs. Conditional

For the role of fathers, the member roles in participant networks differ by gender and race of the participant. White, non-Hispanic females received significantly more support from their fathers compared to other races and men. Black, non-Hispanic males received far less than any group except white Hispanic females. Figure 11 illustrates the role of the father in network function by gender and race. This figure illustrates the relative percent contribution of functional support provided by fathers in terms of providing financial support by gender and race of participant.

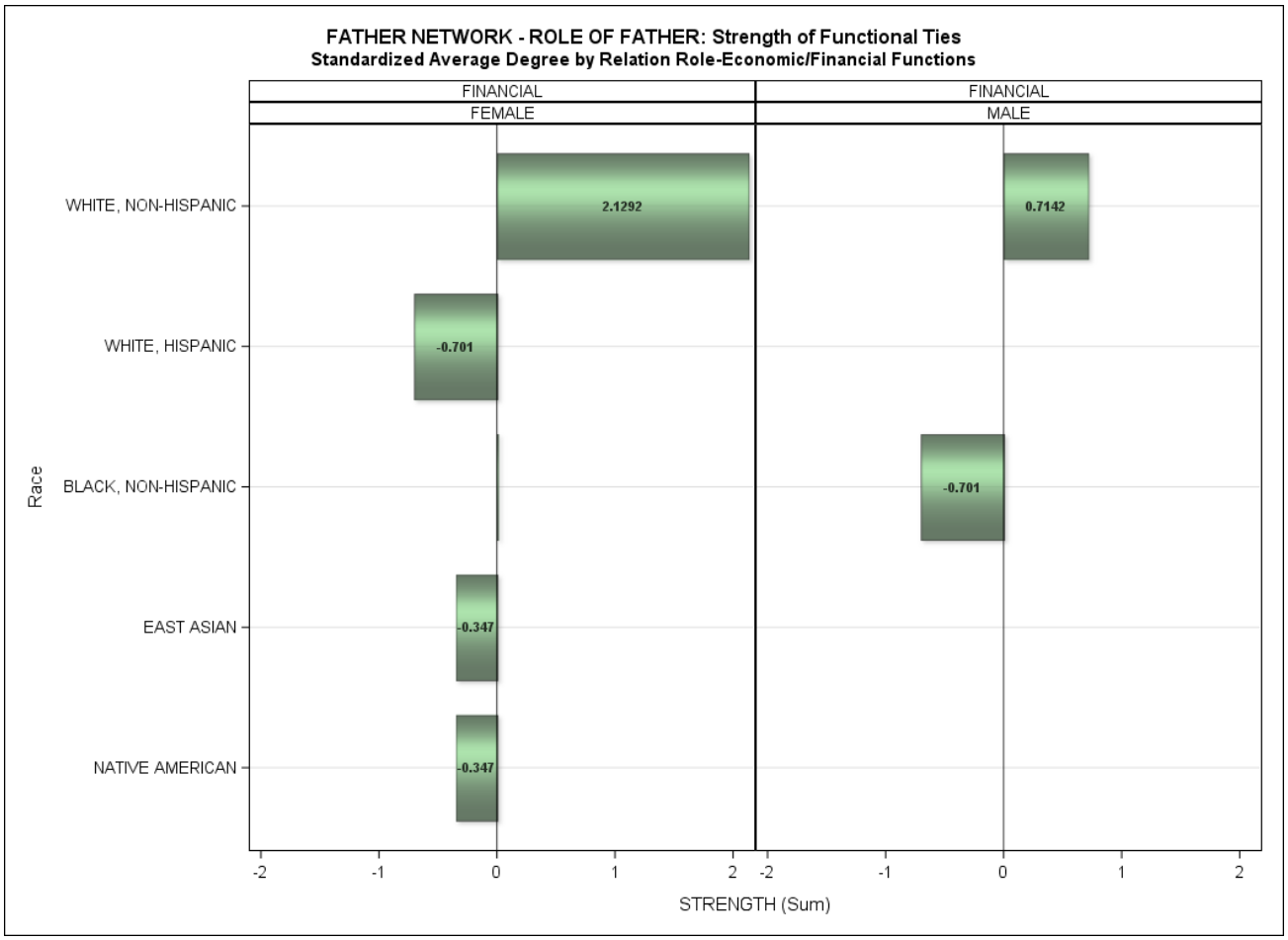


Figure 11: Role of Father in Network Function by Gender and Race. *This figure illustrates the relative percent contribution of functional support provided by father in terms of providing financial support by gender and race of participant.*

Strength of Ties

Based on the standardized average degree among the relations that provided financial support, the overall strength of functional ties was highest among the participant and spouse (5.73) and the participant and female friends (5.32), as shown in Figure 12. The responses from Black males regarding their Jobs network reveal that nearly all of the observations for relations that contribute financial support lie between the mean and 5.507. Black males report that female co-workers provide above average financial support when it comes to participant Jobs network (5.507) compared to what Hispanic males (5.177) and non-Hispanic white males report (4.792).

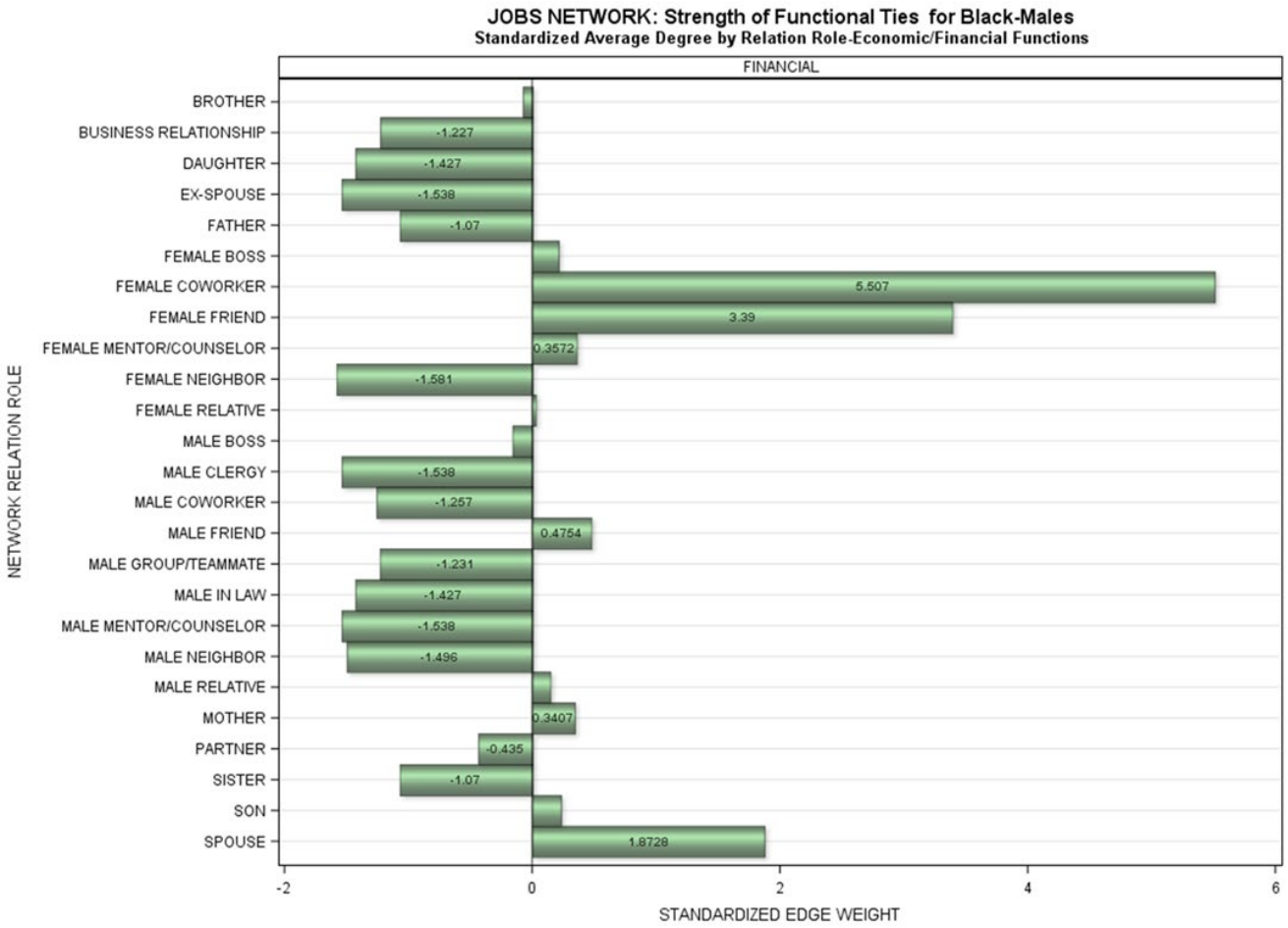


Figure 12: Strength of Functional Ties for Non-Hispanic Black Males' Jobs Network. *The strength of functional ties is above average and highest, based on the standardized average degree among female co-workers (5.51) that provided financial support.*

Formation – How Participants and Contacts Met

The alluvial diagram featured in Figure 13 represents a specific demographic group (non-Hispanic Black males) and how they met their contacts (represented as roles). The boxes on the left side represent the roles included in the group's network specified in the diagram. The boxes on the right side represent how participants met their contacts. The size of the box is the proportional relative frequency which follows the gray line (alluvial) flowing out of each box from the left to the right. The lines flowing out of each box on the left side are of proportional size to the share of each box's how they met criteria. Lastly, the boxes on the right represent the proportion overall for the "how they met" condition for non-Hispanic Black males. The category "unknown" means the participant did not answer the question, and or responses were missing. Where n=1 or n=2, sample sizes were too small, and any inferences based on these were done with great caution. Figure 13 illustrates that for non-Hispanic Black males, male friend was the most often cited contact and had the highest relative frequency. Not including the unknown condition, male friends were most often met through a co-worker followed by mutual friend (college and co-worker). While male friends have the highest relative frequency for non-Hispanic white males as shown in Figure 14, male co-worker is also often cited as a contact.

The alluvial flows for non-Hispanic white males indicate more conditions where male friends were met, i.e., co-worker, mutual friend, business, church, college, grade school etc.

Figure 13: Black, Non-Hispanic Males, How They Met Their Social Connections. *This figure illustrates that for non-Hispanic Black males, male friends had the highest relative frequency and was met through co-worker, mutual friends, college, online and business.*

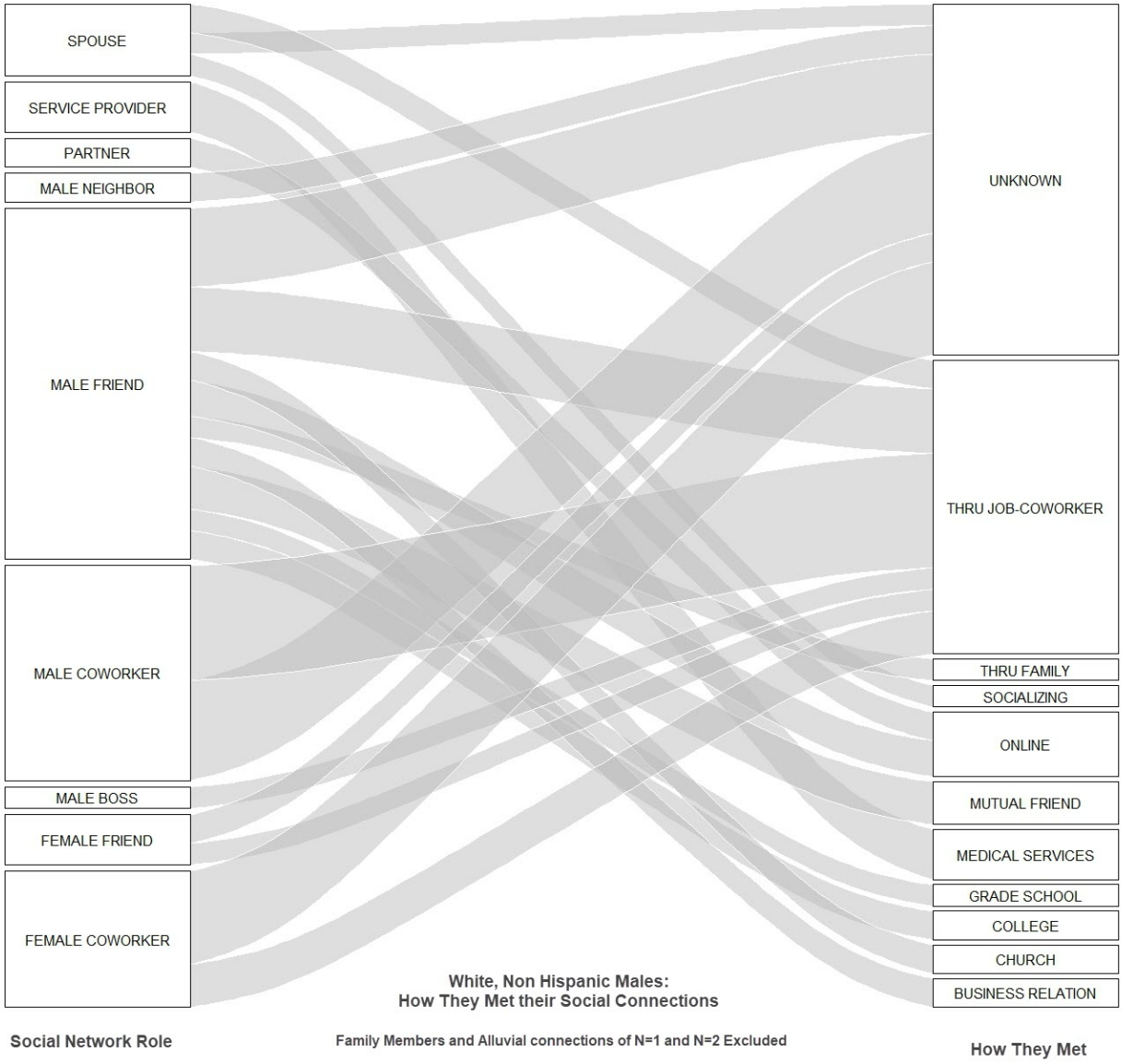


Figure 14: White, Non-Hispanic Males, How They Met Their Social Connections. *This figure illustrates that for non-Hispanic white males, male friend had the highest relative frequency and was met through co-worker, business, church, college.*

Network Graph Representations

The network visualization represented in Figure 15 illustrates the betweenness centrality of network members in the Job network where participants have been excluded. However, the graph represents personal networks, therefore, all pairs of alters are also "bridged" by the egos (participants) who are connected to all the contacts (McCarthy, Lubbers, Vacca Molina, 2019). This figure shows that female friends and brothers are especially important contacts in participants' Jobs network and who perhaps know people in terms of social and personal circles or contexts and family relations. Additional network graph visualizations are represented in Appendix B and C.

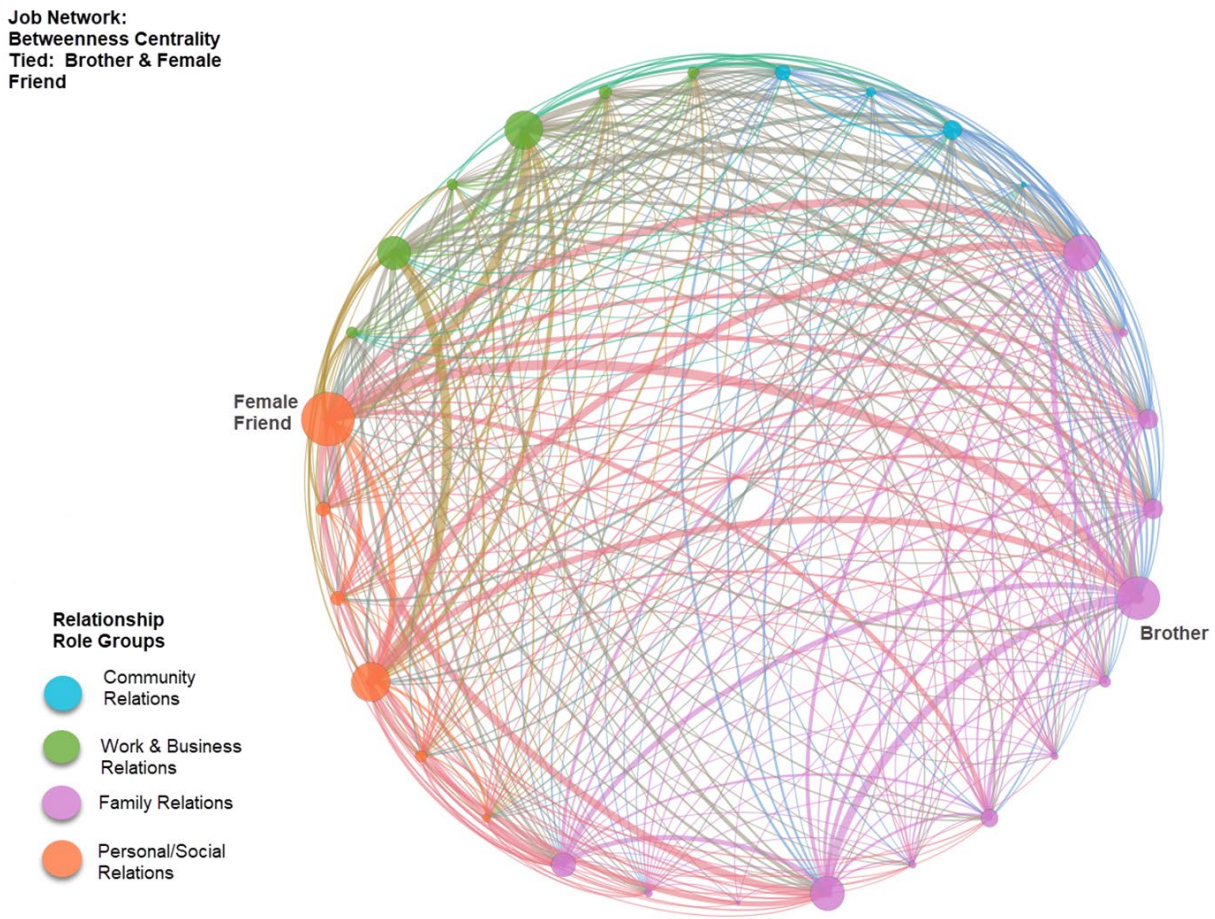
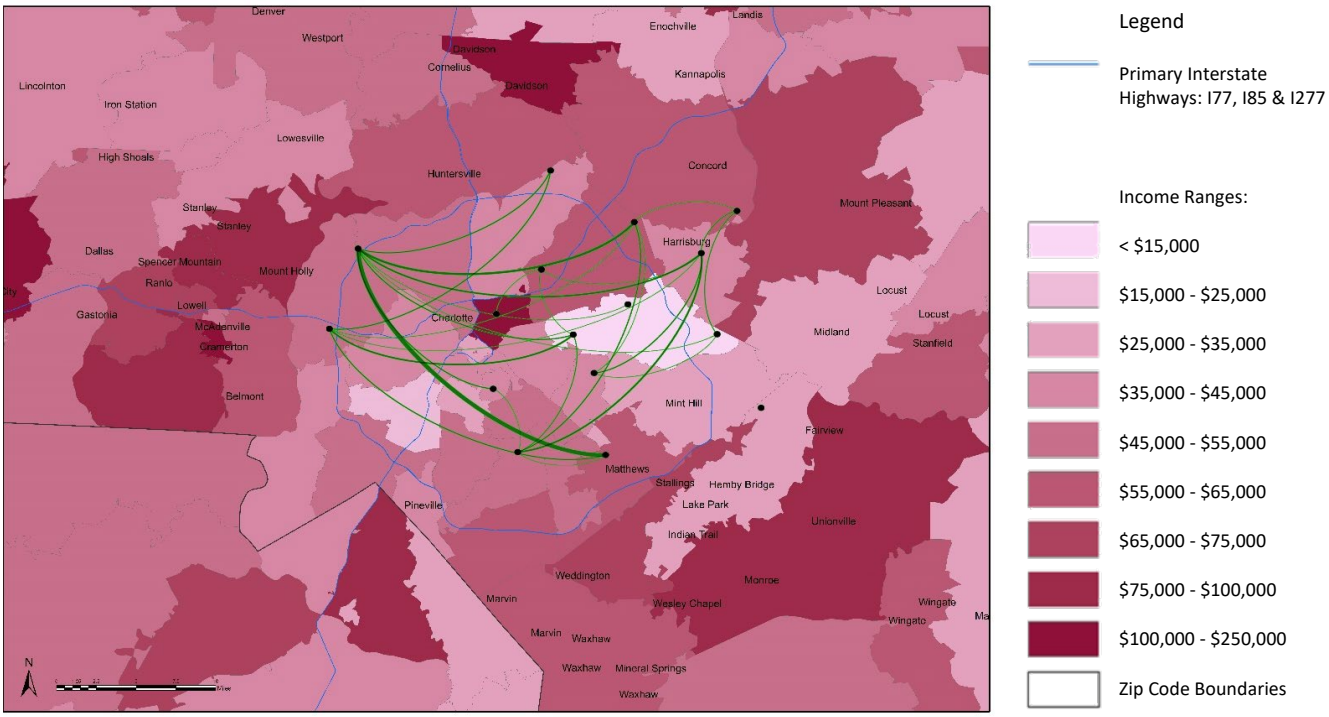


Figure 15: How We Rise Charlotte network visualization. *The HWRCLT network illustrates the betweenness centrality of network members in the Job network.*

Spatial Dimensions of Personal Networks

Map 2 (below) highlights the spatial distribution of social contacts and household income by zip codes. Nodes (black points) represent participants by zip codes and network members and the green lines represent ties between participants and contacts. Each observation was aggregated for all the participants where information was available and the spatial weight assigned between pairs represents the weight of the ties between participants and contacts (the green lines) on the map connecting the nodes (Rey, Arribas-Bel, Wolf, 2020). The map results suggest that participants contacts were located in non-adjacent zip codes. For example, participants located in the western section (between Mount Holly and Huntersville) of Charlotte were most connected to contacts in Matthews, a neighboring suburb located south of Charlotte. Participants in the western section would appear to earn similar levels of income as their contacts in the southern section, $55,000-$65,000.



Map 2: Spatial Dimensions of Personal Networks. *This map highlights the spatial distribution of personal networks and household income by zip codes. Nodes represent participants by zip codes and network contacts.*

X. Conclusions and Recommendations

The aim of the HWRCLT study was to better understand how the personal social networks of Charlotte residents' function and allow individuals to marshal and exchange social capital and resources to enhance mobility.

Data was collected to map and compare social networks with respect to jobs, education, housing, child care, and health care across various demographic groups via one-on-one interviews. The following research questions guided the research:

1) What are the structural characteristics of personal ego-centered networks?
    a) Number of nodes (size of personal networks)
    b) Formation
    c) Function
    d) Strength
    e) Homophily
2) How do network characteristics vary by attributes of the participant?

Findings suggest that white females benefited most when it came to financial support from their fathers and white non-Hispanic males had more opportunities to form important relationships under various conditions and contexts compared to other groups, specifically Black non-

Hispanic males. Findings support early research that argue social relationships are important in terms of resources and access to opportunities (i.e., diversity and formation opportunities) within each group as well as the importance of social networks for jobs.

These findings may be the single most important factor in terms of unpacking the dichotomy that exist between the perception of Charlotte and the experiences of the people that live and work in this city.

While study participants' contacts resided in non-adjacent zip codes, their income earnings were similar.

Limitations

There were several limitations to this study. First, the generalizability of our sample is limited due to the small sample size compared to national samples. The small sample may have contributed to issues related to small subgroups (e.g., tie formation). Although the study sample was fairly representative of Charlotte, a higher proportion of women participants responded in addition to younger age groups which may bias the results of subgroup comparisons. Another potentially valuable area of research that we did not explore in this analysis were the structural characteristics of the COVID-19 networks. This was the first use of the questionnaire and there were several opportunities to improve upon the design and wording of the questions. Lastly, the condensed timeframe to pilot and pretest the new instrument compounded by the interruption of the COVID-19 pandemic did not allow for the completion of a youth component and should be the focus of a follow up study.

Recommendations

The personal ego-centered network datasets collected by the research team is extraordinarily rich and its potential and applicability goes beyond this exploratory study. Other dimensions that may influence network interactions should be the focus of future research, such as factors that facilitate and hinder opportunities to form personal networks and factors that promote female friends and brothers as central characters in social and personal circles or contexts, and family relations.

In summary, non-Hispanic Black males face myriad barriers including lack of opportunities to form important connections and receive functional support. Network-focused interventions addressing the broad socioeconomic challenges faced by this population in particular constitute an important component in efforts to improve overall economic mobility in Charlotte. Lastly, particular attention should be placed on opportunities that are both evidence based and culturally informed.

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Appendices

Appendix A: Analysis of Variance (ANOVA) and Tukey's Test

The GLM Procedure

Dependent Variable: STRENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	28	160618.9172	5736.3899	7.94	<.0001
Error	261	188586.6000	722.5540		
Corrected Total	289	349205.5172			

R-Square	Coeff Var	Root MSE	STRENGTH Mean
0.459955	118.6500	26.88037	22.65517

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ROLE	28	160618.9172	5736.3899	7.94	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
ROLE	28	160618.9172	5736.3899	7.94	<.0001

Levene's Test for Homogeneity of STRENGTH Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
ROLE	28	4.1415E8	14791232	5.31	<.0001
Error	261	7.2679E8	2784636		

Number of obs = 290

W = Wilks' lambda L = Lawley-Hotelling trace
P = Pillai's trace R = Roy's largest root

Source	Statistic		df	F(df1,	df2) =	F	Prob>F	
ties	W	0.5400	28	28.0	261.0	7.94	0.0000	e
	P	0.4600		28.0	261.0	7.94	0.0000	e
	L	0.8517		28.0	261.0	7.94	0.0000	e
	R	0.8517		28.0	261.0	7.94	0.0000	e
Residual			261					
Total			289					

e = exact, a = approximate, u = upper bound on F

ALL NETWORK: Strength of Functional Ties
Standardized Average Degree by Relation Role-Providing Logistical Support
15:40 Sunday, August 16, 2020

The GLM Procedure

Tukey's Studentized Range (HSD) Test for STRENGTH

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	261
Error Mean Square	722.554
Critical Value of Studentized Range	5.33773
Minimum Significant Difference	45.372

Means with the same letter are not significantly different.

Tukey Grouping				Mean	N	ROLE
		A		88.30	10	FEMALE FRIEND
		A				
B		A		80.60	10	SPOUSE
B		A				
B		A	C	65.20	10	MOTHER
B		A	C			
B	D	A	C	56.90	10	MALE FRIEND
B	D	A	C			
E B	D	A	C	46.50	10	FEMALE COWORKER
E B	D		C			
E B	D	F	C	41.10	10	FATHER
E B	D	F	C			
E B	D	F	C	37.60	10	PARTNER
E	D	F	C			
E	D	F	C	31.80	10	MALE COWORKER
E	D	F	C			
E	D	F	C	24.20	10	BROTHER
E	D	F	C			
E	D	F	C	20.40	10	FEMALE MENTOR/COUNSELOR
E	D	F				
E	D	F		18.40	10	SISTER
E	D	F				
E	D	F		15.40	10	SERVICE PROVIDER
E	D	F				
E	D	F		15.10	10	FEMALE NEIGHBOR
E	D	F				
E	D	F		14.30	10	FEMALE RELATIVE
E	D	F				
E	D	F		12.80	10	FEMALE BOSS
E	D	F				
E	D	F		11.80	10	MALE MENTOR/COUNSELOR
E		F				

ALL NETWORK: Strength of Functional Ties
Standardized Average Degree by Relation Role-Providing Logistical Support
15:40 Sunday, August 16, 2020

The GLM Procedure

Tukey's Studentized Range (HSD) Test for STRENGTH

Means with the same letter are not significantly different.

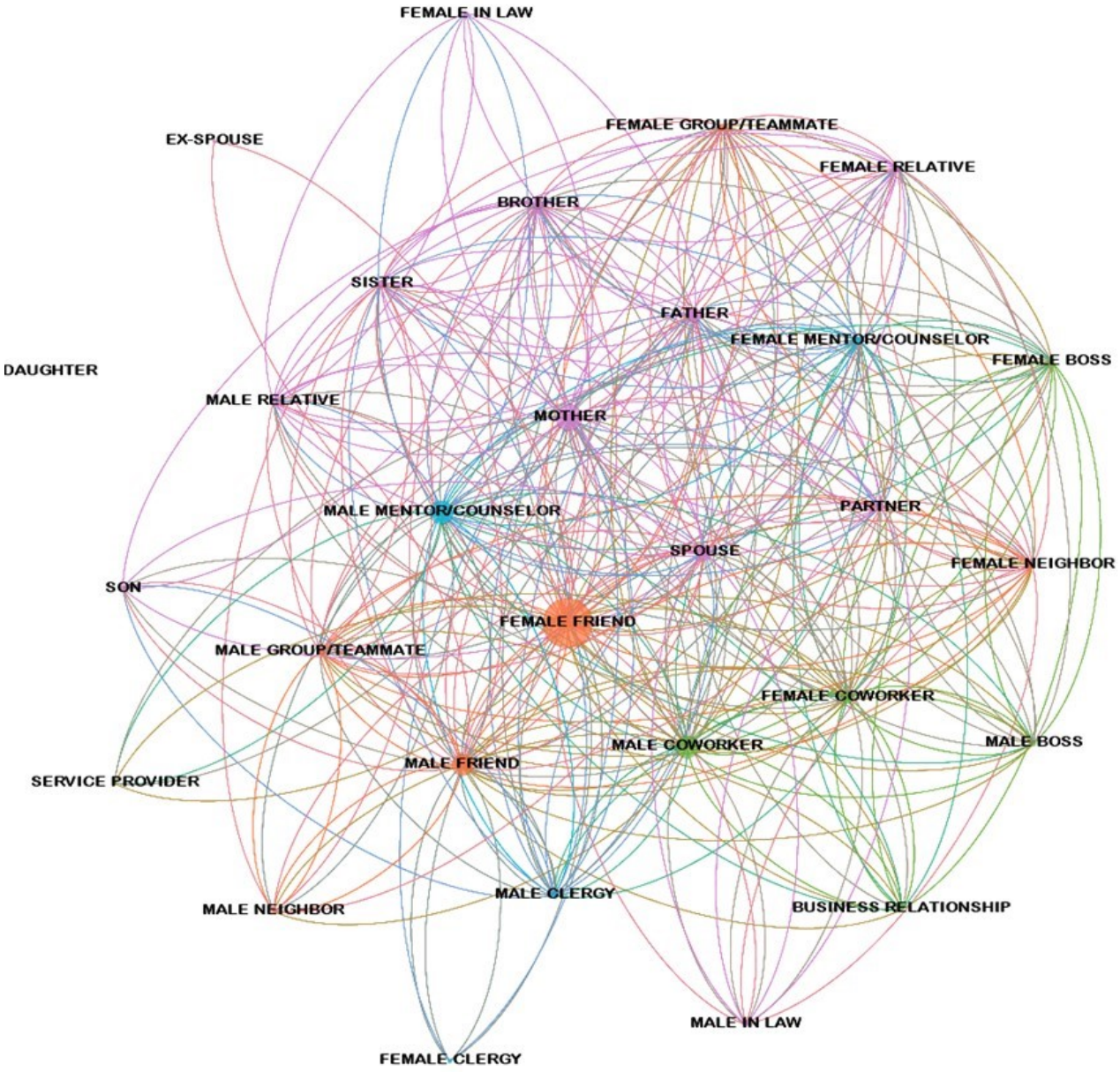
Tukey Grouping		Mean	N	ROLE
E	F	11.10	10	BUSINESS RELATIONSHIP
E	F			
E	F	9.80	10	DAUGHTER
E	F			
E	F	9.40	10	MALE BOSS
E	F			
E	F	8.20	10	FEMALE GROUP/TEAMMATE
E	F			
E	F	7.80	10	MALE GROUP/TEAMMATE
E	F			
E	F	6.30	10	MALE RELATIVE
E	F			
E	F	5.40	10	MALE CLERGY
E	F			
E	F	4.30	10	SON
E	F			
E	F	4.20	10	EX-SPOUSE
E	F			
E	F	3.80	10	MALE NEIGHBOR
E	F			
E	F	3.80	10	MALE IN LAW
E	F			
E	F	2.30	10	FEMALE IN LAW
	F			
	F	0.20	10	FEMALE CLERGY

Adjusted predictions Number of obs = 290

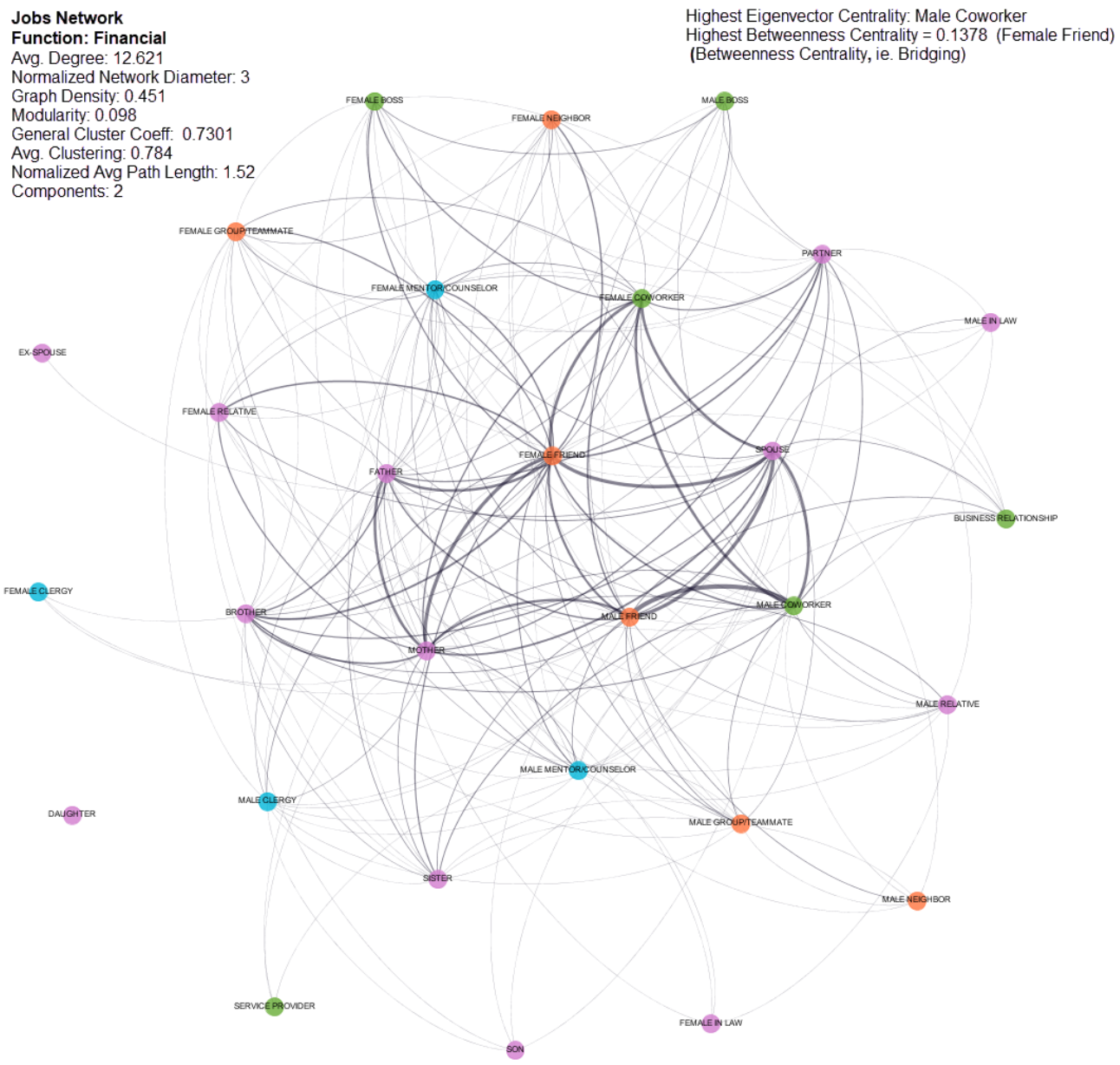
Expression : Linear prediction, predict(equation(strength))

	Margin	Delta-method Std. Err.	t	P>|t|	[95% Conf.	Interval]
ties						
BROTHER	24.2	8.500318	2.85	0.005	7.462069	40.93793
BUSINESS RELATIONSHIP	11.1	8.500318	1.31	0.193	-5.637931	27.83793
DAUGHTER	9.8	8.500318	1.15	0.250	-6.937931	26.53793
EX-SPOUSE	4.2	8.500318	0.49	0.622	-12.53793	20.93793
FATHER	41.1	8.500318	4.84	0.000	24.36207	57.83793
FEMALE BOSS	12.8	8.500318	1.51	0.133	-3.937931	29.53793
FEMALE CLERGY	.2	8.500318	0.02	0.981	-16.53793	16.93793
FEMALE COWORKER	46.5	8.500318	5.47	0.000	29.76207	63.23793
FEMALE FRIEND	88.3	8.500318	10.39	0.000	71.56207	105.0379
FEMALE GROUP/TEAMMATE	8.2	8.500318	0.96	0.336	-8.537931	24.93793
FEMALE IN LAW	2.3	8.500318	0.27	0.787	-14.43793	19.03793
FEMALE MENTOR/COUNSELOR	20.4	8.500318	2.40	0.017	3.662069	37.13793
FEMALE NEIGHBOR	15.1	8.500318	1.78	0.077	-1.637931	31.83793
FEMALE RELATIVE	14.3	8.500318	1.68	0.094	-2.437931	31.03793
MALE BOSS	9.4	8.500318	1.11	0.270	-7.337931	26.13793
MALE CLERGY	5.4	8.500318	0.64	0.526	-11.33793	22.13793
MALE COWORKER	31.8	8.500318	3.74	0.000	15.06207	48.53793
MALE FRIEND	56.9	8.500318	6.69	0.000	40.16207	73.63793
MALE GROUP/TEAMMATE	7.8	8.500318	0.92	0.360	-8.937931	24.53793
MALE IN LAW	3.8	8.500318	0.45	0.655	-12.93793	20.53793
MALE MENTOR/COUNSELOR	11.8	8.500318	1.39	0.166	-4.937931	28.53793
MALE NEIGHBOR	3.8	8.500318	0.45	0.655	-12.93793	20.53793
MALE RELATIVE	6.3	8.500318	0.74	0.459	-10.43793	23.03793
MOTHER	65.2	8.500318	7.67	0.000	48.46207	81.93793
PARTNER	37.6	8.500318	4.42	0.000	20.86207	54.33793
SERVICE PROVIDER	15.4	8.500318	1.81	0.071	-1.337931	32.13793
SISTER	18.4	8.500318	2.16	0.031	1.662069	35.13793
SON	4.3	8.500318	0.51	0.613	-12.43793	21.03793
SPOUSE	80.6	8.500318	9.48	0.000	63.86207	97.33793

Appendix B: Network Graph Visualizations: Female Friend



Appendix C: Network Graph Visualizations: Jobs Network



Appendix D: Network Node Statistics

GENDER							
	Network	**N**	**MIN**	**MAX**	**MEAN**	**STD**	**Coef of Var**
Female	Actual Number	110	1	22	7.65	4.20	0.55
Female	AVOID	110	0	14	1.53	2.47	1.62
Female	JOBS	110	0	5	2.76	1.61	0.58
Female	HOUSING	110	0	5	1.24	1.51	1.22
Female	HEALTH	110	0	5	1.38	1.60	1.16
Female	CHILDCARE	110	0	5	0.65	1.28	1.99
Female	EDUCATION	110	0	5	1.27	1.52	1.19
Female	COVID	110	0	5	3.10	1.40	0.45
Male	Actual Number	67	2	17	8.48	3.94	0.47
Male	AVOID	67	0	11	2.12	2.45	1.15
Male	JOBS	67	0	5	3.06	1.64	0.54
Male	HOUSING	67	0	5	1.51	1.53	1.02
Male	HEALTH	67	0	5	1.55	1.26	0.81
Male	CHILDCARE	67	0	5	0.64	1.16	1.81
Male	EDUCATION	67	0	5	1.78	1.77	1.00
Male	COVID	67	0	5	3.27	1.45	0.44
AGE							
	Network	**N**	**MIN**	**MAX**	**MEAN**	**STD**	**Coef of Var**
21-29	Actual Number	61	2	22	7.84	4.65	0.59
21-29	AVOID	61	0	14	2.08	3.08	1.48
21-29	JOBS	61	0	5	2.95	1.45	0.49
21-29	HOUSING	61	0	5	1.51	1.40	0.93
21-29	HEALTH	61	0	5	1.18	1.23	1.04
21-29	CHILDCARE	61	0	5	0.36	1.08	3.00
21-29	EDUCATION	61	0	5	1.77	1.67	0.94
21-29	COVID	61	0	5	3.00	1.37	0.46
30-39	Actual Number	52	3	19	7.60	3.73	0.49
30-39	AVOID	52	0	11	1.52	2.31	1.52
30-39	JOBS	52	0	5	2.88	1.77	0.61
30-39	HOUSING	52	0	5	1.23	1.63	1.32
30-39	HEALTH	52	0	5	1.23	1.44	1.17
30-39	CHILDCARE	52	0	5	1.10	1.61	1.47
30-39	EDUCATION	52	0	5	1.25	1.63	1.31
30-39	COVID	52	1	5	3.19	1.39	0.43
40-49	Actual Number	22	4	15	9.09	3.52	0.39
40-49	AVOID	22	0	5	1.77	1.66	0.94
40-49	JOBS	22	0	5	2.64	1.71	0.65
40-49	HOUSING	22	0	5	2.23	1.90	0.85
40-49	HEALTH	22	0	5	1.95	1.79	0.91
40-49	CHILDCARE	22	0	3	0.82	1.01	1.23

40-49	EDUCATION	22	0	5	1.55	1.79	1.16
40-49	COVID	22	1	5	3.50	1.44	0.41
50-59	Actual Number	27	1	17	8.63	4.41	0.51
50-59	AVOID	27	0	7	1.78	2.19	1.23
50-59	JOBS	27	0	5	3.15	1.70	0.54
50-59	HOUSING	27	0	3	0.59	0.89	1.50
50-59	HEALTH	27	0	5	1.85	1.56	0.84
50-59	CHILDCARE	27	0	3	0.59	0.93	1.57
50-59	EDUCATION	27	0	5	1.33	1.41	1.06
50-59	COVID	27	0	5	3.15	1.59	0.50
60-69	Actual Number	9	3	10	6.33	2.74	0.43
60-69	AVOID	9	0	3	0.89	1.17	1.31
60-69	JOBS	9	0	5	2.22	1.64	0.74
60-69	HOUSING	9	0	2	0.67	0.87	1.30
60-69	HEALTH	9	0	4	1.78	1.72	0.97
60-69	CHILDCARE	9	0	1	0.11	0.33	3.00
60-69	EDUCATION	9	0	5	1.33	1.87	1.40
60-69	COVID	9	1	5	3.00	1.66	0.55
70-79	Actual Number	5	5	14	8.60	3.91	0.45
70-79	AVOID	5	0	6	1.80	2.49	1.38
70-79	JOBS	5	0	4	2.80	1.64	0.59
70-79	HOUSING	5	0	4	2.00	1.58	0.79
70-79	HEALTH	5	0	4	2.20	1.64	0.75
70-79	CHILDCARE	5	0	0	0.00	0.00	
70-79	EDUCATION	5	0	1	0.20	0.45	2.24
70-79	COVID	5	3	5	4.00	1.00	0.25
RACE							
	Network	**N**	**MIN**	**MAX**	**MEAN**	**STD**	**Coef of Var**
WHITE, NON-HISPANIC	Actual Number	78	3	22	8.15	3.94	0.48
WHITE, NON-HISPANIC	AVOID	78	0	11	1.74	2.38	1.36
WHITE, NON-HISPANIC	JOBS	78	0	5	3.08	1.69	0.55
WHITE, NON-HISPANIC	HOUSING	78	0	5	1.60	1.73	1.08
WHITE, NON-HISPANIC	HEALTH	78	0	5	1.76	1.52	0.87
WHITE, NON-HISPANIC	CHILDCARE	78	0	5	0.69	1.25	1.81
WHITE, NON-HISPANIC	EDUCATION	78	0	5	1.55	1.73	1.11
WHITE, NON-HISPANIC	COVID	78	0	5	3.63	1.22	0.34
BLACK, NON-HISPANIC	Actual Number	55	1	20	7.78	4.40	0.57
BLACK, NON-HISPANIC	AVOID	55	0	11	1.64	2.48	1.52
BLACK, NON-HISPANIC	JOBS	55	0	5	2.84	1.69	0.59
BLACK, NON-HISPANIC	HOUSING	55	0	5	1.04	1.19	1.14
BLACK, NON-HISPANIC	HEALTH	55	0	5	1.31	1.55	1.18
BLACK, NON-HISPANIC	CHILDCARE	55	0	5	0.71	1.31	1.85
BLACK, NON-HISPANIC	EDUCATION	55	0	5	1.24	1.54	1.24
BLACK, NON-HISPANIC	COVID	55	0	5	2.78	1.58	0.57
BLACK, NON-HISPANIC	Actual Number	3	3	12	8.00	4.58	0.57
WHITE, HISPANIC	Actual Number	26	3	21	8.12	4.45	0.55
WHITE, HISPANIC	AVOID	26	0	14	2.58	3.13	1.21
WHITE, HISPANIC	JOBS	26	0	5	2.46	1.33	0.54

WHITE, HISPANIC	HOUSING	26	0	5	1.12	1.63	1.46
WHITE, HISPANIC	HEALTH	26	0	5	1.04	1.31	1.26
WHITE, HISPANIC	CHILDCARE	26	0	2	0.19	0.49	2.56
WHITE, HISPANIC	EDUCATION	26	0	5	1.31	1.52	1.16
WHITE, HISPANIC	COVID	26	0	5	2.92	1.41	0.48
BLACK, HISPANIC	AVOID	3	0	2	0.67	1.15	1.73
BLACK, HISPANIC	JOBS	3	1	3	2.00	1.00	0.50
BLACK, HISPANIC	HOUSING	3	0	0	0.00	0.00	
BLACK, HISPANIC	HEALTH	3	0	2	1.33	1.15	0.87
BLACK, HISPANIC	CHILDCARE	3	0	0	0.00	0.00	
BLACK, HISPANIC	EDUCATION	3	0	3	1.67	1.53	0.92
BLACK, HISPANIC	COVID	3	1	4	2.00	1.73	0.87
EAST ASIAN	Actual Number	3	3	11	6.00	4.36	0.73
EAST ASIAN	AVOID	3	0	3	1.00	1.73	1.73
EAST ASIAN	JOBS	3	1	4	3.00	1.73	0.58
EAST ASIAN	HOUSING	3	1	2	1.33	0.58	0.43
EAST ASIAN	HEALTH	3	2	3	2.33	0.58	0.25
EAST ASIAN	CHILDCARE	3	0	0	0.00	0.00	
EAST ASIAN	EDUCATION	3	3	4	3.67	0.58	0.16
EAST ASIAN	COVID	3	2	3	2.67	0.58	0.22
SOUTHEAST ASIAN	Actual Number	7	3	11	7.57	3.15	0.42
SOUTHEAST ASIAN	AVOID	7	0	4	0.86	1.57	1.84
SOUTHEAST ASIAN	JOBS	7	0	5	2.57	1.90	0.74
SOUTHEAST ASIAN	HOUSING	7	0	3	1.71	1.38	0.81
SOUTHEAST ASIAN	HEALTH	7	0	2	0.86	0.90	1.05
SOUTHEAST ASIAN	CHILDCARE	7	0	3	0.71	1.11	1.56
SOUTHEAST ASIAN	EDUCATION	7	0	5	1.71	2.06	1.20
SOUTHEAST ASIAN	COVID	7	1	5	2.71	1.38	0.51
Other or N/A	Actual Number	4	3	15	7.75	5.25	0.68
Other or N/A	AVOID	4	0	4	1.25	1.89	1.51
Other or N/A	JOBS	4	2	5	3.25	1.26	0.39
Other or N/A	HOUSING	4	1	2	1.75	0.50	0.29
Other or N/A	HEALTH	4	0	2	0.75	0.96	1.28
Other or N/A	CHILDCARE	4	0	5	2.75	2.22	0.81
Other or N/A	EDUCATION	4	0	2	1.25	0.96	0.77
Other or N/A	COVID	4	2	4	3.25	0.96	0.29
Educational Attainment							
	Network	**N**	**MIN**	**MAX**	**MEAN**	**STD**	**Coef of Var**
Less Than High School	Actual Number	9	3	14	7.67	3.12	0.41
Less Than High School	AVOID	9	0	6	1.67	2.00	1.20
Less Than High School	JOBS	9	0	4	1.78	1.64	0.92
Less Than High School	HOUSING	9	0	2	0.67	0.87	1.30
Less Than High School	HEALTH	9	0	4	1.56	1.67	1.07
Less Than High School	CHILDCARE	9	0	1	0.11	0.33	3.00
Less Than High School	EDUCATION	9	0	3	0.44	1.01	2.28
Less Than High School	COVID	9	1	5	3.00	1.58	0.53
High School	Actual Number	16	4	16	7.56	3.24	0.43
High School	AVOID	16	0	7	1.63	1.96	1.21

High School	JOBS	16	1	5	2.56	1.15	0.45
High School	HOUSING	16	0	5	1.56	1.55	0.99
High School	HEALTH	16	0	5	1.19	1.42	1.20
High School	CHILDCARE	16	0	2	0.19	0.54	2.90
High School	EDUCATION	16	0	5	1.63	1.36	0.84
High School	COVID	16	0	5	2.31	1.58	0.68
Some college, no degree	Actual Number	18	2	14	7.11	3.34	0.47
Some college, no degree	AVOID	18	0	6	1.28	2.02	1.58
Some college, no degree	JOBS	18	1	5	2.83	1.47	0.52
Some college, no degree	HOUSING	18	0	5	1.78	1.56	0.87
Some college, no degree	HEALTH	18	0	5	1.44	1.46	1.01
Some college, no degree	CHILDCARE	18	0	5	0.61	1.38	2.25
Some college, no degree	EDUCATION	18	0	5	2.28	1.64	0.72
Some college, no degree	COVID	18	1	5	3.00	1.28	0.43
Associate degree	Actual Number	3	7	8	7.33	0.58	0.08
Associate degree	AVOID	3	0	1	0.67	0.58	0.87
Associate degree	JOBS	3	0	4	2.33	2.08	0.89
Associate degree	HOUSING	3	0	1	0.67	0.58	0.87
Associate degree	HEALTH	3	0	3	1.67	1.53	0.92
Associate degree	CHILDCARE	3	0	3	1.33	1.53	1.15
Associate degree	EDUCATION	3	0	1	0.33	0.58	1.73
Associate degree	COVID	3	1	4	3.00	1.73	0.58
Bachelor's Degree	Actual Number	80	1	20	8.04	4.17	0.52
Bachelor's Degree	AVOID	80	0	11	1.89	2.42	1.28
Bachelor's Degree	JOBS	80	0	5	3.16	1.63	0.52
Bachelor's Degree	HOUSING	80	0	5	1.58	1.68	1.07
Bachelor's Degree	HEALTH	80	0	5	1.58	1.57	1.00
Bachelor's Degree	CHILDCARE	80	0	5	0.66	1.35	2.04
Bachelor's Degree	EDUCATION	80	0	5	1.40	1.61	1.15
Bachelor's Degree	COVID	80	1	5	3.53	1.24	0.35
Grad Degree	Actual Number	45	3	21	7.89	4.53	0.57
Grad Degree	AVOID	45	0	14	1.53	2.87	1.87
Grad Degree	JOBS	45	0	5	2.87	1.67	0.58
Grad Degree	HOUSING	45	0	5	0.78	1.13	1.45
Grad Degree	HEALTH	45	0	5	1.27	1.34	1.06
Grad Degree	CHILDCARE	45	0	5	0.93	1.25	1.34
Grad Degree	EDUCATION	45	0	5	1.44	1.75	1.21
Grad Degree	COVID	45	0	5	2.91	1.47	0.51
Current Employment Status							
	Network	**N**	**MIN**	**MAX**	**MEAN**	**STD**	**Coef of Var**

EMPLOYED FULL TIME	Actual Number	152	1	22	8.22	4.19	0.51
EMPLOYED FULL TIME	AVOID	152	0	14	1.92	2.59	1.35
EMPLOYED FULL TIME	JOBS	152	0	5	2.93	1.62	0.55
EMPLOYED FULL TIME	HOUSING	152	0	5	1.36	1.52	1.11
EMPLOYED FULL TIME	HEALTH	152	0	5	1.52	1.48	0.97
EMPLOYED FULL TIME	CHILDCARE	152	0	5	0.67	1.25	1.87
EMPLOYED FULL TIME	EDUCATION	152	0	5	1.45	1.62	1.12
EMPLOYED FULL TIME	COVID	152	0	5	3.31	1.37	0.41
EMPLOYED PART-TIME	Actual Number	13	2	16	7.00	3.89	0.56
EMPLOYED PART-TIME	AVOID	13	0	4	1.15	1.46	1.27
EMPLOYED PART-TIME	JOBS	13	0	5	2.23	1.42	0.64
EMPLOYED PART-TIME	HOUSING	13	0	5	1.00	1.53	1.53
EMPLOYED PART-TIME	HEALTH	13	0	5	0.85	1.46	1.73
EMPLOYED PART-TIME	CHILDCARE	13	0	3	0.54	1.13	2.09
EMPLOYED PART-TIME	EDUCATION	13	0	4	1.15	1.46	1.27
EMPLOYED PART-TIME	COVID	13	0	5	2.23	1.59	0.71
UNEMPLOYED, SEEKING WORK	Actual Number	1	5	5	5.00		
UNEMPLOYED, SEEKING WORK	AVOID	1	0	0	0.00		
UNEMPLOYED, SEEKING WORK	JOBS	1	5	5	5.00		
UNEMPLOYED, SEEKING WORK	HOUSING	1	1	1	1.00		
UNEMPLOYED, SEEKING WORK	HEALTH	1	1	1	1.00		
UNEMPLOYED, SEEKING WORK	CHILDCARE	1	0	0	0.00		
UNEMPLOYED, SEEKING WORK	EDUCATION	1	0	0	0.00		
UNEMPLOYED, SEEKING WORK	COVID	1	1	1	1.00		
UNEMPLOYED, NOT SEEKING WORK	Actual Number	2	8	10	9.00	1.41	0.16
UNEMPLOYED, NOT SEEKING WORK	AVOID	2	0	2	1.00	1.41	1.41
UNEMPLOYED, NOT SEEKING WORK	JOBS	2	5	5	5.00	0.00	0.00
UNEMPLOYED, NOT SEEKING WORK	HOUSING	2	0	5	2.50	3.54	1.41
UNEMPLOYED, NOT SEEKING WORK	HEALTH	2	0	5	2.50	3.54	1.41
UNEMPLOYED, NOT SEEKING WORK	CHILDCARE	2	0	0	0.00	0.00	
UNEMPLOYED, NOT SEEKING WORK	EDUCATION	2	4	5	4.50	0.71	0.16
UNEMPLOYED, NOT SEEKING WORK	COVID	2	3	4	3.50	0.71	0.20
STUDENT, NOT EMPLOYED	Actual Number	2	3	5	4.00	1.41	0.35
STUDENT, NOT EMPLOYED	AVOID	2	0	0	0.00	0.00	

STUDENT, NOT EMPLOYED	JOBS	2	1	5	3.00	2.83	0.94
STUDENT, NOT EMPLOYED	HOUSING	2	1	2	1.50	0.71	0.47
STUDENT, NOT EMPLOYED	HEALTH	2	1	2	1.50	0.71	0.47
STUDENT, NOT EMPLOYED	CHILDCARE	2	0	0	0.00	0.00	
STUDENT, NOT EMPLOYED	EDUCATION	2	3	5	4.00	1.41	0.35
STUDENT, NOT EMPLOYED	COVID	2	2	3	2.50	0.71	0.28
STUDENT, AND EMPLOYED	Actual Number	1	6	6	6.00		0.00
STUDENT, AND EMPLOYED	AVOID	1	0	0	0.00		
STUDENT, AND EMPLOYED	JOBS	1	1	1	1.00		0.00
STUDENT, AND EMPLOYED	HOUSING	1	0	0	0.00		
STUDENT, AND EMPLOYED	HEALTH	1	0	0	0.00		
STUDENT, AND EMPLOYED	CHILDCARE	1	0	0	0.00		
STUDENT, AND EMPLOYED	EDUCATION	1	1	1	1.00		0.00
STUDENT, AND EMPLOYED	COVID	1	0	0	0.00		
RETIRED	Actual Number	3	3	5	4.33	1.15	0.27
RETIRED	AVOID	3	0	1	0.33	0.58	1.73
RETIRED	JOBS	3	2	3	2.67	0.58	0.22
RETIRED	HOUSING	3	0	4	2.00	2.00	1.00
RETIRED	HEALTH	3	0	1	0.67	0.58	0.87
RETIRED	CHILDCARE	3	0	0	0.00	0.00	
RETIRED	EDUCATION	3	0	3	1.33	1.53	1.15
RETIRED	COVID	3	1	3	2.33	1.15	0.49
WORK IN HOME, NO SALARY	Actual Number	3	4	10	6.33	3.21	0.51
WORK IN HOME, NO SALARY	AVOID	3	0	0	0.00	0.00	
WORK IN HOME, NO SALARY	JOBS	3	0	2	1.33	1.15	0.87
WORK IN HOME, NO SALARY	HOUSING	3	0	2	0.67	1.15	1.73
WORK IN HOME, NO SALARY	HEALTH	3	0	2	1.00	1.00	1.00
WORK IN HOME, NO SALARY	CHILDCARE	3	0	4	1.67	2.08	1.25
WORK IN HOME, NO SALARY	EDUCATION	3	0	1	0.33	0.58	1.73
WORK IN HOME, NO SALARY	COVID	3	2	4	2.67	1.15	0.43

Parent (Yes, NO)							
	Network	**N**	**MIN**	**MAX**	**MEAN**	**STD**	**Coef of Var**
Not Parent	Actual Number	97	2	22	8.02	4.22	0.53
Not Parent	AVOID	97	0	14	1.86	2.77	1.49
Not Parent	JOBS	97	0	5	3.06	1.64	0.54
Not Parent	HOUSING	97	0	5	1.45	1.56	1.07
Not Parent	HEALTH	97	0	5	1.54	1.51	0.99
Not Parent	CHILDCARE	97	0	5	0.21	0.79	3.83
Not Parent	EDUCATION	97	0	5	1.56	1.74	1.12
Not Parent	COVID	97	0	5	3.20	1.43	0.45
Parent	Actual Number	80	1	19	7.90	4.02	0.51
Parent	AVOID	80	0	11	1.63	2.08	1.28
Parent	JOBS	80	0	5	2.65	1.58	0.60
Parent	HOUSING	80	0	5	1.20	1.47	1.23
Parent	HEALTH	80	0	5	1.34	1.43	1.07
Parent	CHILDCARE	80	0	5	1.18	1.46	1.24
Parent	EDUCATION	80	0	5	1.35	1.50	1.11
Parent	COVID	80	0	5	3.13	1.42	0.45

About Us

Tonya Farrow-Chestnut *is a Research Manager with Brookings's How We Rise Charlotte project.* ***George Metz*** *and* ***Karen Sutton*** *each served as a Community Liaison with Brookings's How We Rise Charlotte project.*

This technical report corresponds to "How social networks in Charlotte impact economic mobility," a report from The Brookings Institution's How We Rise project (HWR). HWR is a larger series of research and analysis that helps to explain the dynamics of social connections and the policy solutions that intentionally focus on the social network determinants of economic mobility and equity.

HWR is part of the ***Race, Prosperity, and Inclusion Initiative****, Brookings's cross-program effort focused on issues of equity, racial justice, and economic mobility for low-income communities and communities of color.*