## Relationships among Diverse Students in a Cohort-Based MSW Program: A Social Network Analysis

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URL: http://mc.manuscriptcentral.com/jswe  Email: jswe@cswe.org
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Abstract

Peer relationships are an integral part of social work education that may reduce stress and increase cultural competency. This study examined three types of social ties (academic, friendship, and professional) among first-semester students in a cohort-based MSW program. Data were collected three times during the semester and analyzed using social network analysis. By semester’s end, students had an average of 10.2 ties (significantly more than the mid-semester mean of 8.6 ties/student), almost exclusively within their own cohort. Participants (N=144) had a greater percentage of ties with people of a different racial/ethnic group at end-of-semester compared to mid-semester, although relationships remained more likely to exist between students of the same race/ethnicity, especially for friendships. Implications for MSW education are discussed.

Introduction

Peer relationships and the interactions that occur within them are an integral component of master of social work (MSW) programs. Research has found that graduate students’ peer relationships can promote wellbeing, academic success and persistence, and help build professional networks after graduation (Casstevens, Waites, & Outlaw, 2012; Collins, Coffey, & Morris, 2010; Morimoto & Yang, 2013). They are also an avenue through which students gain cultural competency and become professionally socialized (Miller, 2010; Petrovich & Lowe, 2005), both of which are important aspects of social work education. Yet little is known about the actual composition of students’ peer networks, including the number and types of relationships, and how race or ethnicity might relate to these characteristics of students’ networks. To address this gap in the literature, this study examined peer relationships among a diverse group of incoming MSW students in their first semester of the program. It describes...
three types of relationships – academic discussions, friendships, and professional influence – in an MSW program that used a cohort-based learning model during the first foundation semester.

**Literature Review**

**Student Peer Relationships**

Peer relationships are valuable for several different aspects of social work education. First, prior research with students in other disciplines has found that peer relationships are an important aspect of learning. Early proponents of collaborative learning, Rau and Heyl (1990) noted that “isolated students do not learn as much or as well as students who are embedded in a network of informal social relations” (p. 144). Studies with undergraduates have shown that students with larger academic discussion networks and those with more interconnections among their student peers have higher grades and are more likely to persist in enrollment than those with fewer relationships and less interconnected networks (Rizzuto, LeDoux, & Hatala, 2009; Thomas, 2000). Graduate students in sociology have reported gaining knowledge and practical advice through discussions with their classmates (Hunt, Mair, & Atkinson, 2012). In a study of undergraduates, Walsh, Larsen, and Parry (2009) found that students reported receiving academic advice from friends in a class more than any other source.

Second, fostering peer relationships among graduate students has been suggested as a way colleges can address student stress and improve the student experience (Grady, La Touche, Oslawsik-Lopez, Powers, & Simacek, 2014; Moore, 2011). This is relevant because social work students face a variety of stressors including academic pressure, financial and work related concerns, family responsibilities, and juggling internships with classroom assignments (Collins et al., 2010; Dziegielewski, Turnage, & Roest-Marti, 2004; Kinman & Grant, 2011). In a study of MSW students in Wales, Collins and colleagues (2010) found clinically high levels of
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psychological distress in 42% of the students surveyed. Support from classmates was cited as the most important type of support in easing the demands of school. Classmates are unique providers of support because they are considered more approachable than advisors and better able to understand the circumstances of being a student than non-students (Chui, Ziemer, Palma, & Hill, 2014).

Peer relationships may be particularly important for minority students. Graduate students from underrepresented groups cite the importance of interactions with classmates, especially those of similar backgrounds, for receiving support, succeeding in school, staying enrolled, and fostering wellbeing (Casstevens et al., 2012; DeFour & Hirsch, 1990; Johnson-Bailey, Valentine, Cervero, & Bowles, 2008; Pidgeon, Archibald, & Hawkey, 2014). This is noteworthy because the need for MSWs from diverse backgrounds has been documented for decades and retention of minority and non-traditional students is important for social work programs (Bowie & Hancock, 2000; Casstevens et al., 2012).

Finally, peer relationships are an important element in MSW students’ professional socialization, serving as channels through which messages about professional identity and norms are conveyed (Miller, 2010; Oliver, 2013; Schreiber, 1989). Social work requires a unique set of skills and attitudes including critical thinking (Robbins, 2014), acceptance, and valuing the inherent worth of individuals (Sowbel, 2012). These qualities are fostered when students interact with classmates from diverse backgrounds (Dovidio et al., 2004; Gurin, Dey, Hurtado, & Gurin, 2002). In addition, cultural competency, a phrase used to describe knowledge, skills, and values needed to engage in practice with diverse individuals and groups, is also promoted by interactions with classmates from different backgrounds (Petrovich & Lowe, 2005). However, graduate students report higher levels of awareness of cultural differences than actual knowledge
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needed to navigate diversity (King & Howard-Hamilton, 2003). Increased contact with people from different racial or ethnic backgrounds has been shown improve to bridge this gap between awareness and knowledge (Engberg, Meader, & Hurtado, 2003; Kelly & Gayles, 2010).

Cross-Group Interaction

Both the explicit and implicit curricula of MSW programs aim to develop student competencies in “ethical and professional behavior” and engaging “diversity and difference in practice” (Council on Social Work Education, 2015, p. 7). In addressing the implicit curriculum, the Council on Social Work Education’s (CSWE) Educational Policy and Accreditation Standards charge social work programs “to provide a learning environment that models affirmation and respect for diversity and difference” and “to continually improve the learning environment to support persons with diverse identities” (CSWE, 2015, p. 14). The standards specifically list the demographic composition of the student body as a component of the learning environment, which is expected to support difference while promoting program goals. A diverse student body is an implied foundation for socializing social work students and building cultural competency.

Indeed, research on cross-group contact supports the importance of interactions with diverse peers. A group with which an individual identifies is his or her ingroup and groups that include others are outgroups (Roberto & Kimboko, 1989). Contact with people from an outgroup (i.e., cross-group contact) can facilitate positive attitudes toward that and other outgroups, reduce cross-group anxiety and prejudice, increase knowledge, trust, empathy and perspective taking, and promote a more nuanced understanding of individual differences within an outgroup (Pettigrew & Tropp, 2006; Pettigrew, Tropp, Wagner, & Christ, 2011).
Student body diversity may shape the learning environment, but does not ensure that students will engage in cross-group contact in a way that is supportive of professional socialization and cultural competency. In fact, a persistent effect in human relationships is the tendency for people to interact with others who are similar to themselves. This inclination, called homophily, may limit the degree to which diverse students interact and reduce the impact a diverse student body can have on cultural competency and professional socialization. Racial or ethnic homophily and age homophily are the most common types of homophily in personal relationships (McPherson, Smith-Lovin, & Cook, 2001), yet cultural competency related to ethnicity, race, and age is an important part of the implicit curriculum of social work programs.

It is, therefore, important to look beyond structural composition (i.e., the percentage of different groups in a student body) to interactional aspects of diversity such as peer relationships when assessing the learning environment of an MSW program. Not only is it helpful to know whether diverse students interact with each other, but also to recognize that the details of the interactions may matter. For example, the specific interactions of having discussions and socializing with diverse classmates have been shown to affect students’ cross-cultural awareness, appreciation, and acceptance beyond the structural effects of classroom diversity (Gurin et al., 2002). The friendship relationship is particularly salient for transmitting the positive effects of cross-group contact (Turner, Hewstone, Voci, Paolini, & Christ, 2007). Cross-group friendships can have both a direct influence on the two people who are friends as well as an indirect effect on their other friends. People with an extended cross-group friendship (i.e., they know someone who has a cross-group friendship) also experience changes in attitudes, understanding, and behavior toward outgroup members (see Turner et al., 2007 for a review).

Cross-Group Relationships in Cohort-Based Learning
Cohort-based learning is an educational intervention designed to encourage positive peer relationships (Lei, Gorelick, Short, Smallwood, & Wright-Porter, 2011). Cohort-based models of education place students into groups—or cohorts—in which classes are taken together for the duration of the course of study (Lei et al., 2011; Maher, 2005). An individual cohort commonly has between 10 and 26 students (Lei et al., 2011) with high levels of interaction among the students.

Theoretically, cohorts should facilitate relationships between students from different backgrounds or with different characteristics due to the high levels of interaction within them. In order for cross-group friendships to occur, individuals must have opportunities for interaction with dissimilar people (Turner et al., 2007). Low-cost social environments where interaction occurs regularly and does not require extra effort have been found to be characterized by less homophily than high-cost environments where more personal initiative is required (Leszczensky & Pink, 2015; Windzio & Bicer, 2013). This is evidenced in secondary schools where relationships within classrooms are less homophilous than those across classroom boundaries (Leszczensky & Pink, 2015; Valente, Fujimoto, Unger, Soto, & Meeker, 2013). As described in the literature, cohorts in higher education are low-cost environments with high levels of interaction which might make them catalysts for cross-group friendships.

A related aspect of cohort-based learning models is that students in cohorts are likely to exhibit multiplexity in their relationships. Multiplexity occurs when individuals have multiple types of interactions or roles with each other (Kadushin, 2012), such as being work colleagues as well as friends and sharing financial advice. Ties are more likely to be multiplex when individuals have opportunities to interact regularly or in enclaves. On one hand, multiplex relationships are associated with greater levels of trust and intimacy, but they can also give rise
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to complications when difficulties arise in one of the multiple interaction or role types
(Kadushin, 2012). In addition, multiplex relationships have been found to be more homophilous
than relationships involving only one relationship or interaction type (McPherson et al., 2001).

While educational cohorts seem like an ideal environment to promote the formation of
social ties, particularly among diverse individuals, little research has examined the social
networks formed within cohorts. To date, much of the research on cohorts has been pre-
experimental or qualitative. This work suggests that cohorts are associated with the development
of strong social and academic peer support systems, a high level of academic collaboration, a
sense of student belonging and cohesiveness, integration of academic material into professional
settings, better academic success, and improved student persistence (Lei et al., 2011). For
example, a qualitative study of master of education students in cohort-based learning found
strong “family-like” bonds emerged among the students (Maher, 2005). The students shared
responsibility for each other’s learning and developed “an appreciation for actively listening to
peers” (p. 205) and the ability to take the perspective of others. Potential disadvantages of cohort
systems are that they may become dysfunctional if cliques develop or personality conflicts arise
and that students may become less likely to interact with students outside their cohort, resulting
in an insular learning environment (Lei et al., 2011; Maher, 2005). While the possible benefits
of cohorts have been identified, networks within graduate cohorts have rarely been described
specifically in terms of their formation or examined in relation to cross-group interactions.

To describe the formation of peer relationships among diverse students within the context
of educational cohorts, we conducted exploratory research using social network analysis. The
setting for the research was an MSW program that adopted a cohort system for its foundation
students in 2009. After adopting the cohort system, faculty in the program noted students had a
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stronger sense of professional identity, more group bonding, and greater appreciation for classmates than before the cohort system was implemented (Colby, 2013). This paper builds on these initial reports to focus on the social ties students developed during their first semester in the MSW program within the cohort system. Our specific aims were to: (1) describe social ties in the foundation semester in the context of a cohort-based MSW program (2) determine whether age or race/ethnicity were related to the number social ties students had, and (3) determine whether racial/ethnic homophily was present in students’ social ties and whether there were changes in levels of racial/ethnic homophily from mid- to end-of-semester.

Methods

This study was a social network analysis of student peer relationships in one semester of an MSW program. Social network analysis is a research paradigm with theory and methods that focus on relationships between people. It expresses a systems perspective and considers not only the direct relationships that an individual has, but also the interconnected network of relationships in which the individual is placed (Wasserman & Faust, 2005). The methods of social network analysis help visualize these networks and answer a variety of questions about social relations such as the structure of people’s connections and the content, homophily, and multiplexity of the connections.

Setting and Recruitment

The study was conducted at a school of social work in a large public university in an ethnically diverse city in the southern United States. The school has approximately 235 full-time and 115 part-time MSW students and uses cohort-based learning for the first semester of the program. All aspects of the study were approved by the university’s Institutional Review Board.
In the fall of 2014, incoming students were assigned by the school to one of six cohorts ranging in size from 21 to 27 students. There were three cohorts of full-time students, two cohorts of part-time students, and one cohort of Advanced Standing students. The full-time and part-time students were in the *regular track* and took all of their classes within their assigned cohort. The Advanced Standing students were enrolled full-time and labeled a “cohort” administratively, but in practice did not receive their education in a cohort-based learning model. They took only one class together as a cohort and the remainder of their classes as individuals within the larger student body of second year students. In addition to the classroom, the students had opportunities to interact with each other in student organizations, events sponsored by the school, and during field placements.

**Sample Description**

All students who entered the program in the Fall semester of 2014 were offered the opportunity to participate in the study. In all, 144 students (98.0% of the incoming student body) enrolled in the study. Table 1 provides information about the sample which contained a large majority of females and a diverse distribution of race and ethnicity. Participants’ age range was 20 to 57 years old with a mean age of 29.4 years (SD = 8.7 years). There were no significant differences in demographic characteristics across the cohorts but there were cohort differences for incoming GPA \[F_{(5, 132)} = 3.645, p = .004\]. Students in the Advanced Standing cohort had significantly higher incoming GPAs than students in each of the two part-time cohorts (p = .008, p = .019). [INSERT TABLE 1 HERE]

**Data Collection**

Participants were given paper-and-pen surveys at the beginning, middle, and end of the Fall semester. At summer student orientation (July/August), the survey had one open ended
social network question. At mid-semester (October) and again at the end of the semester (November/December), participants completed a survey that consisted of a roster of names of classmates in the incoming class. The roster presented a list of all students in the incoming class with checkboxes to indicate the existence of the specific relationships described below. The students completed the surveys during class time. Participants who were absent from class were contacted individually by email and given seven days to complete the questionnaire.

**Measures**

**Student attributes.**

Demographic information was collected from participants’ admissions records. Gender was a dichotomous measure with Male or Female values. Race/Ethnicity values were Black, White, Hispanic, or Other, which included non-specified or unknown. Because of the possibility that differences in academic discussion ties might be linked to differences in academic proficiency, GRE scores and incoming GPAs were also gathered from admissions records. Incoming GPA was the student’s grade point average from the last 60 hours of undergraduate study. GRE scores were the sum of the student’s verbal and quantitative reasoning scores. Because the admissions data contained scores from two versions of the GRE, the raw GRE scores were converted to normalized GRE scores (z-scores) for each version.

**Social ties.**

In the terminology of social network analysis, the networks we examined consist of a set of _actors_ (students) and the _ties_ that connected them. The classmates to whom an actor was connected are the actor’s _alters_. For each type of tie that exists among a set of actors, a separate network can be conceived and is usually named after the tie (e.g., Friendship Network, Advice Network, Professional Influence Network).
To gather information about social ties prior to the beginning of classes, at summer orientation (t1), we asked participants to “List the names of anyone you know who is an incoming student.” In designing the research, we spoke with graduates and second year students who indicated it was rare to know classmates before the semester began. Rather than provide a lengthy network roster, we asked this open ended question to get a general sense of how many incoming students the participants knew. While this method of name generation is common in social network analysis, it is subject to issues with accuracy due to limitations of informant recall (Borgatti, Everett, & Johnson, 2013). In spite of this limitation, the short, open ended question was used for efficiency and to provide an approximate baseline of ties.

At mid-semester (t2) and the end of the semester (t3), the network questionnaire was in the form of a roster of the students in the incoming class, organized by cohort. The questionnaire collected information about three relationship types: Academic Discussions, Professional Influence, and Friendships. Participants were asked to mark a box next to the name of each classmate to indicate a tie existed. For each relationship type, there was an option to mark “No one listed below.” This response was treated as a lack of ties rather than a failure to answer the question (i.e., missing data). The questionnaire was developed through consultation with second year MSW students and graduates of the program.

For Academic Discussion relationships, the questionnaire read “I have academic discussions with this person. Examples: study together, discuss school and schoolwork, get feedback on assignments, ask questions about homework.” The Professional Influence item was “This person has influenced my professional development. Examples: go to for professional advice, discuss field placement, discuss social work values, ethics and professionalism.” For Friendships, the questionnaire stated “I consider this person a personal friend. Examples:
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socialize outside classroom, discuss personal matters, call and text, have lunch with, would invite to social events.”

In defining the Academic Discussion and Friendship Networks, a tie between two students was considered to exist if both students nominated each other. In the case of non-respondents, the information provided by their alters was used to determine whether or not a tie existed. The Professional Influence Network was defined solely by the nominations of the participants. Non-respondents had no outgoing ties from them to other students, but could have received incoming ties from respondents who nominated them as being professionally influential.

A General Social Tie was defined as the existence of any type of tie. General Social Ties at the beginning of the semester were based on the classmates known to students. At mid- and end-of-semester, the General Social Ties Network was constructed by summing the Academic Discussions, Professional Influence, and Friendship Networks. This resulted in General Social Tie values from zero to 3. Higher values in the General Social Ties Network represent greater levels of multiplexity in the connection between two students.

Analytic Strategy

Bivariate statistical analyses.

Chi-Square tests were used to examine cohort differences on race/ethnicity and gender. One-way ANOVAs and Brown-Forsythe tests of equality of means followed by Games-Howell post-hoc comparisons were used to examine cohort differences on student age, GRE scores, and incoming GPAs and to determine if there were cohort or race/ethnicity differences in the number of students’ ties. Paired-samples t tests were used in two ways: (1) to determine if there were significant changes in the number of ties from mid-semester to the end of the semester for the
entire student body and race/ethnicity groups and (2) to compare the number of Academic Discussion ties to Friendship and Professional Influence ties. Because the distributions of the number of student ties were not normal at all time points, Related Samples Wilcoxon Signed Rank Tests were used to determine if there were significant changes in the number of ties from mid-semester to the end of the semester within individual cohorts. Pearson’s correlations were used to determine the association between age and number of social ties.

**Network analyses.**

Social network analysis allows researchers to investigate an entire network as a whole (e.g., does the network *as a whole* exhibit homophily?), subgroups within the network (e.g., is the network divided into separate components?), or attributes of individual actors (e.g., how many alters does each actor have?). In this study, network measures for the incoming student body as a whole were calculated. In addition, individual-level network statistics were used to determine if there were changes in the ties of individual students from mid- to end-of-semester. All network statistics were calculated using UCINET 6.579 (Borgatti, Everett, & Freeman, 2002). To compute levels of statistical significance (i.e., p-values) for network analyses, permutation tests were conducted using 50,000 permutations.

**Missing network data.**

Missing data on social relations came from non-participants, enrolled participants who did not complete a questionnaire at one of the data collection points, and participants who provided partial information on the rosters. This missing data was reconstructed by defining ties based on the information given by the alters of a non-respondent (Borgatti, Everett, & Johnson, 2013; Stork & Richards, 1992) for the Academic Discussions and Friendship Networks as described in the Methods section.
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E-I index.

To determine whether changes in the extent of homophily in individual students’ personal networks from mid-semester to end-of-semester were statistically significant, we calculated an E-I index for each participant. The E-I index is a measure developed by Krackhardt and Stern (1988) which signifies the extent which ties are between actors of the same or different groups.

The formula for the E-I index is:

$$E-I\ index = \frac{\text{External Ties} - \text{Internal Ties}}{\text{External Ties} + \text{Internal Ties}}.$$  

The possible range of the E-I index is from -1.0 to +1.0. An E-I index of -1.0 indicates all ties are internal (complete homophily), +1.0 indicates all ties are external, and 0.0 indicates an equal number of external and internal ties.

Findings

Research Aim 1: Describe social ties in the foundation semester

At the beginning of the semester, about one quarter of the participants (n = 34, 24.8%) reported knowing someone in the incoming class. Although one participant reported knowing six other classmates, most (22 of 34) reported knowing just one other classmate. By mid-semester, almost all students (n = 144, 98.0%) had at least one General Social Tie. On average, participants had relationships with 8.6 classmates (SD = 5.1). Table 2 presents the average number of ties by cohort. At the end of the semester, the percent of students with at least one outgoing General Social Tie increased to 99.3% and the average number of ties increased significantly to 10.2 per student (SD = 5.7; t(146) = 5.369, p < .001). The correlation between the General Social Ties at the two time points was .72 (p < .001), indicating that the composition of the General Social Ties Network remained fairly stable between the middle and end of the semester. [INSERT TABLE 2 HERE]
Cohort membership was a dominant factor in the formation of relationships. This can be observed in the network visualizations presented in Figure 1, which show General Social Ties clustering in six distinct groups (the cohorts). At mid-semester, only 4.7% of the ties were outside the students’ home cohorts. There was even more insularity by the end of the semester. The number of ties across cohorts had decreased by eight. While cross-cohort relationships were decreasing, within-cohort ties increased. This resulted in only 3.3% of ties being external to a cohort by the semester’s end. [INSERT FIGURE 1 HERE].

Within the context of a General Social Tie with a peer, multiplexity (i.e., more than one type of relationship or interaction) could be present. Students reported up to three different types of relationships—Academic Discussion, Friendship, or Professional Influence—for each classmate. On average, when a General Social Tie existed, it consisted of 1.6 relationship types (t3, SD = .43). This degree of multiplexity remained constant from the middle of the semester to the end of the semester [t(143) = 1.309, p = .193]. Although the average tie between two students consisted of less than two relationship types, the majority of students (n = 90, 61.2%) named at least one classmate with whom they shared all three relationship types suggesting they had developed a close connection among their peers.

**Academic Discussion ties.**

Academic Discussion ties were the most common type of relationship reported by the students. Over 96% of the students had at least one Academic Discussion partner at mid- and end-of-semester. At mid-semester, the average number of Academic Discussion ties per student was 6.2 (SD = 4.0). This had increased significantly by the end of the semester to 7.2 per student (SD = 4.2; t(146) = 3.652, p < .001; Cohen’s d effect size = .25). There were significantly more
Academic Discussion ties than Professional Influence ties \([t_3 \quad t_{(126)} = 2.148, \ p = .034; \ \text{Cohen’s d effect size} = .18]\) or friends \([t_3 \quad t_{(146)} = 11.703, \ p < .001; \ \text{Cohen’s d effect size} = .97]\).

Academic Discussion ties were primarily within cohorts (97.6\% at t2 and 98.9\% at t3). In spite of this, all six of the cohorts had at least one student who had an Academic Discussion tie with a student from another cohort at mid-semester. However, by the end of the semester, these cross-cohort discussion ties were mainly dissolved, and only two cohorts remained connected.

**Professional Influence ties.**

At mid-semester, 81.6\% of the respondents reported at least one professionally influential classmate. There were 4.3 Professional Influence ties per student (SD = 4.6). By the end of the semester, the percent of respondents reporting at least one professionally influential classmate had risen to 91.3\%. The number of influential classmates reported had significantly increased to 6.3 per student (SD = 6.1; \(t_{(115)} = 4.788, \ p < .001; \ \text{Cohen’s d effect size} = .36\)).

As with academic discussions, professional influence occurred mainly within the cohort boundaries. There were nevertheless more cross-cohort connections in terms of Professional Influence ties than Academic Discussion or Friendships ties. At mid-semester, 93.6\% of the Professional Influence ties were internal to a cohort. This increased to 95.7\% by the end of the semester.

**Friendship ties.**

A substantial portion of the students formed friendships. At mid-semester, 87.8\% of the students had at least one friend among their classmates. The average number of friends was 3.3 per student (SD = 3.1). By the end of the semester, 91.8\% of the students had at least one friend among their classmates and there was a small, but significant increase in the number friends per
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student to 3.6 (SD = 3.1; \( t_{(146)} = 2.060, p = .041 \); Cohen’s \( d \) effect size = .11). The majority of friendships (96.2% at t2, 98.5% at t3) took place within the cohorts.

**Advanced Standing and part-time cohorts.**

Advanced Standing students did not engage in cohort-based learning and took only one class together as a “cohort.” At the beginning of the semester, Advanced Standing students reported knowing 1.4 (SD = 1.9) other incoming students while students in the other cohorts reported knowing between .23 and .36 classmates (see Table 2). By mid-semester, Advanced Standing students reported General Social Ties with 3.7 same-year classmates (SD = 1.8) – significantly fewer than students in any other cohort, who reported between 8.3 to 10.8 alters \( [F_{(5, 115.640)} = 7.463, p < .001] \). Cohort differences remained at the end of the semester \( [F_{(5, 123.547)} = 3.363, p = .007] \). Advanced Standing students reported significantly fewer General Social Ties (p-values from .001 to .045) than students in all cohorts except Part-Time Cohort D (\( p = .06 \)).

The specific relationship type where this pattern was most pronounced was Academic Discussions \( [t_{2} F_{(5, 112.924)} = 8.403, p < .001; t_{3} F_{(5, 123.182)} = 4.649, p = .001] \) where the Advanced Standing students had significantly fewer ties than students in any of the other cohorts (t3 p-values from < .001 to .016) except Part-Time Cohort E at the end of the semester (t3 p = .099).

The Advanced Standing cohort had fewer ties per student than other cohorts in the Professional Influence and Friendship Networks, but the differences were not statistically significant except for one comparison with a full-time cohort that had more friends than the other cohorts \( [t_{2} F_{(5, 83.240)} = 9.819, p < .001, \text{ post hoc } p < .001; t_{3} F_{(5, 88.618)} = 6.228, p < .001; \text{ post hoc } p = .005] \).

After mid-semester, the Advanced Standing students became disconnected from the rest of the incoming student body such that by the end of the semester, they were the only cohort that had no ties with students from a different cohort (see Figure 1).
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For many of the measured relationships, there were no differences in the amount of ties formed by full-time and part-time students. However, at mid-semester (though not end-of-semester), full-time students (M = 7.4 ties, SD = 4.0) had more Academic Discussion ties than part-time students (M = 6.0 ties, SD = 3.7; t(122) = 1.981, p = .05, Cohen’s d effect size = .37).

For Friendship Ties, full-time students (M₁₂ = 4.1 ties, SD₁₂ = 3.7; M₃₃ = 4.4, SD₃₃ = 3.6) had more ties than part-time students at both the middle and end of the semester (M₁₂ = 2.7 ties, SD₁₂ = 2.2; t₁₁₂ = 12.576, p = .001, Cohen’s d effect size = .46; M₃₃ = 2.9 ties, SD₃₃ = 2.4; t₁₁₂ = 15.869, p < .001, Cohen’s d effect size = .47).

**Research Aim 2: Determine whether age or race/ethnicity were related to the number of social ties students had**

Although the tendency was for older students to have fewer ties across all relationship types than their younger counterparts, these correlations were not statistically significant.

Race/ethnicity was also not a major factor in the number of students’ social ties. Across all relationship types, White students generally had more ties than any other group, but this difference was statistically significant only for the end-of-semester Academic Discussion ties \( [F(3,95.676) = 3.587, p = .017] \) when they had significantly more Academic Discussion ties than Hispanic students (t = 2.234, p = .039) and Other race/ethnicity students (t = 3.426, p = .046).

The mean number of each type of tie for the racial/ethnic groups are presented in Table 3.

[INSERT TABLE 3 HERE]

**Research Aim 3: Determine whether racial/ethnic homophily was present in students’ social ties and whether there were changes in levels of racial/ethnic homophily from mid- to end-of-semester**
As reported earlier, the student body was quite diverse racially/ethnically (see Table 1). Based on the composition of the student body, almost 71% of the possible pairs of students were between students of different races or ethnicities. Before the semester began, a minority of the reported “knows of” ties (42.9%) occurred between students of different races/ethnicities. At mid-semester, a majority of General Social Ties (59.7%) were between students of a different race or ethnicity. By the end of the semester the percentage of cross-race/ethnicity General Social Ties had increased to 62.9%. Despite this increase, the percentage cross-race/ethnicity ties was significantly less (p < .001) than the expected percent of 70.6%, indicating the presence of racial/ethnic homophily existed in the network as a whole. With careful inspection, this can be detected in Figure 1. If there was no racial/ethnic homophily in the network, the symbols for students would appear randomly in the network visualizations. Instead, there is a slight tendency for students of the same race/ethnicity to be closer to one another in the network maps.

In the General Social Ties network, multiplex ties exhibited more homophily; the more types of relationships (from zero to 3) that existed between a pair of students, the more likely the students were to be of the same race/ethnicity. Just over half (53.6%) of the mid-semester General Social Ties that consisted of at least two relationship types (tie value ≥ 2) were between students of different race ethnicities. For General Social Ties that consisted of all three relationship types, only 41.4% were cross-race/ethnicity. This pattern was less pronounced at the end of the semester when 56.0% of General Social Ties with values ≥ 2 were cross-race/ethnicity and 52.3% of General Social Ties with values = 3 were cross-race/ethnicity.

The percentages of cross-race/ethnicity ties in the Academic Discussion and Professional Influence Networks had percentages similar to the General Social Ties Network (61.3% and 61.8% respectively at t3). However, the Friendship Network was more homophilous (51.7% of
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the t3 ties were cross-race/ethnicity). Nevertheless, over half of the students (58.5%) at mid-
semester and almost two-thirds of the students at the end of the semester (65.3%) had at least one
cross-race/ethnicity friendship. Even larger portions of students were friends with someone who
had a cross-race/ethnicity friendship (i.e., had extended cross-group friendships). At mid-
semester almost three-quarters (74.1%) of the student body had either a direct or extended cross-
race/ethnicity friendship and by the end of the semester 84.4% did.

At the individual level, homophily was examined using the E-I index of each student.
An E-I index of zero or greater indicates that at least half of the student’s alters have a different
race/ethnicity than the student. At mid-semester, 65.8% of the students had at least this degree
of diversity in their General Social Ties. By the end of the semester, this increased to 79.6%.
For most relationship types, students realized small, but statistically significant decreases in the
homophily of their alters after the middle of the semester. The exception was the Friendship
Network where the decrease in homophily was not significant. Table 4 shows the average
decrease in E-I index scores for each relationship type. [INSERT TABLE 4 HERE].

Discussion

The MSW students in this study exhibited multiple ties during their first semester.
Mostly, these ties were made by mid-semester, yet there were small to moderate increases in
students’ networks from mid- to end-of-semester. Relationships existed primarily within
cohorts, although a few students reported ties with students in other cohorts. These findings add
a quantitative description to the literature on student interaction and positive peer relationships
within cohort-based learning models (Lei et al., 2011).

In spite of the fact that students in the full-time cohorts spent more time in class together,
there were no differences in the number of General Social Ties formed based on full-time or
part-time status. This finding suggests that part-time students in a cohort-based learning model are not at a disadvantage in forming general peer relationships in relation to their full-time peers. However the part-time students in our sample formed fewer friendships with their peers than students in the full-time cohorts. For part-time students who may have increased stress due to work and family commitments (Francis & McDonald, 2009; Williams & Kane, 2010), friendships with classmates could be a valuable source of social support. This finding warrants further research to understand the determinants of friendships among classmates for part-time students, and what role, if any, cohort-based learning can play.

We found almost no differences in the number of ties that students of different racial/ethnicities formed in the course of the semester. This is a promising finding in light of previous research that indicates older or minority students may lack social support or feel socially isolated (Casstevens et al., 2012; Johnson-Bailey et al., 2008). However it is noteworthy that the Academic Discussion Network at the end of the semester did exhibit racial/ethnic differences, with White students having significantly more discussion partners than Hispanic or Other students. Because academic discussion networks have been linked to academic success (Rizzuto, LeDoux, & Hatala, 2009; Thomas, 2000), this finding may point to a disparity in beneficial resources for the program’s Hispanic students. Whether or not such inequality in academic discussion networks is linked to poorer academic outcomes merits investigation.

Some degree of racial/ethnic homophily existed in all relationship types. For minority students, there is some evidence to suggest that friendships with students who are similar to themselves are beneficial for support (Johnson-Bailey et al., 2008; Pidgeon et al., 2014), so some homophily among minority students may be beneficial. However, cross-group contact aids professional socialization (Gurin et al., 2002; Petrovich & Lowe, 2005) and is therefore
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desirable. We found that most students had a substantial portion—at least half—of their ties
with classmates from races/ethnicities different than theirs. By the end of the semester, almost
two-thirds had one or more cross-group friendships, a particularly valuable mechanism for cross-
group contact’s benefits (Turner et al., 2007). When we included students whose friends had
cross-group friendships (i.e., had extended cross-group friendships), almost 85% of the student
body had either a direct or extended cross-group friendship. This large percentage was no doubt
enabled by the degree of diversity in the student body, yet the frequency and interconnectedness
of friendships also contributed to this result. We also found evidence to support increased
racial/ethnic diversity in students’ networks over time. Racial/ethnic homophily decreased
significantly from mid-semester to the end of the semester for all but Friendship ties. Perhaps by
creating a low-cost environment for social interactions, the cohort system facilitated cross-group
interactions (Leszczensky & Pink, 2015; Valente et al., 2013).

Racial/ethnic homophily was greater for Friendship ties than Academic Discussion or
Professional Influence ties. Research shows that homophily is a powerful factor across multiple
relationship types, but the literature comparing racial/ethnic homophily for different relationship
types in multiplex ties is scant (McPherson et al., 2001). Therefore, this study’s comparison of
homophily in friendships to other types of relationships among the same set of individuals is
informative. It is likely that homophily was greater in friendships because they require more
effort and are more intimate than academic discussions or professional influence. When
examining multiplex ties, we found that there was greater homophily for ties that consisted of
more relationship types (i.e., had greater multiplexity), a finding consistent with the extant
literature addressing homophily in multiplex ties (McPherson et al., 2001).
While this study presents new information about the formation of social ties within a cohort system, it has several limitations that should be considered in understanding the results. The study focused only on one MSW program in the Southwest and cannot necessarily be generalized to other social work programs with different student populations or in different geographic regions. The social network instrument did not elicit any information about the quality, strength, or frequency of ties; it only collected information about the presence or absence of the ties. Therefore the analyses focus on the number and types of ties, but offer no insight into qualitative aspects of the relationships. We used a different method for assessing ties at pre-test (free recall) than during the semester (network roster). This most likely resulted in discrepancies in reporting and the baseline network data must not be considered comparable to the mid- and end-of-semester networks that relied on rosters for data collection. As such, comparisons across cohorts at each time point are more fitting than comparisons from the beginning of the semester to the other two time points. The number of students in each cohort was relatively small and this limited sample size reduced the power of our analyses to detect significant differences between cohorts. Perhaps most importantly, it is important to recognize that the study does not address what types and numbers of social ties would have developed without the cohort system. We did not collect information about Advanced Standing students’ relationships with second year students which likely resulted in an underrepresentation of the number of social ties Advanced Standing students had. Lastly, it is important to note we make no causal inferences about the effects of the cohort model.

Despite these limitations, this exploratory study contributes to the literature on peer relationships in graduate school and cohort-based learning models by describing the numbers of three types of social relationships among a diverse student body. To our knowledge, this is the...
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first social network analysis of MSW students’ peer relationships. As such, it offers new insights into MSW students’ peer relationships within cohort-based learning and demonstrates that social network analysis is a viable methodology for assessing the learning environment. Future research should examine relationships after the first semester, compare cohort-based programs to those that do not use cohorts, and explore the associations between peer relationships and student outcomes such as stress, academic achievement, and professional socialization.
References


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RELATIONSHIPS AMONG DIVERSE STUDENTS IN A COHORT-BASED MSW PROGRAM


<table>
<thead>
<tr>
<th>Cohort (n)</th>
<th>% Enrolled</th>
<th>Gender</th>
<th>% (n) Female</th>
<th>% (n) Black</th>
<th>% (n) Hispanic</th>
<th>% (n) White</th>
<th>% (n) Other</th>
<th>Age M (SD)</th>
<th>GPA M (SD)</th>
<th>GRE z-scores M (SD)</th>
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<tr>
<td>FT, A (24)</td>
<td>96.0</td>
<td>87.5 (21)</td>
<td>29.2 (7)</td>
<td>12.5 (3)</td>
<td>45.8 (11)</td>
<td>12.5 (3)</td>
<td>28.3 (9.3)</td>
<td>3.4 (.37)</td>
<td>.04 (.9)</td>
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<tr>
<td>FT, B (26)</td>
<td>100.0</td>
<td>96.2 (25)</td>
<td>30.8 (8)</td>
<td>19.2 (5)</td>
<td>46.2 (12)</td>
<td>3.8 (1)</td>
<td>29.9 (9.8)</td>
<td>3.5 (.26)</td>
<td>.03 (1.1)</td>
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</tr>
<tr>
<td>FT, C (24)</td>
<td>96.0</td>
<td>87.5 (21)</td>
<td>20.8 (5)</td>
<td>29.2 (7)</td>
<td>37.5 (9)</td>
<td>12.5 (3)</td>
<td>27.4 (7.1)</td>
<td>3.4 (.37)</td>
<td>.43 (1.0)</td>
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<tr>
<td>PT, D (21)</td>
<td>100.0</td>
<td>85.7 (18)</td>
<td>42.9 (9)</td>
<td>14.3 (3)</td>
<td>42.9 (9)</td>
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<td>32.7 (9.4)</td>
<td>3.3 (.32)</td>
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<tr>
<td>PT, E (26)</td>
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<td>92.3 (24)</td>
<td>50.0 (13)</td>
<td>19.2 (5)</td>
<td>30.8 (8)</td>
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<td>30.8 (7.0)</td>
<td>3.3 (.34)</td>
<td>-.39 (1.0)</td>
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</tr>
<tr>
<td>AS (23)</td>
<td>100.0</td>
<td>91.3 (21)</td>
<td>26.1 (6)</td>
<td>43.5 (10)</td>
<td>21.7 (5)</td>
<td>8.7 (2)</td>
<td>27.7 (9.1)</td>
<td>3.6 (.27)</td>
<td>-.05 (.9)</td>
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</tr>
<tr>
<td>Total (144)</td>
<td>98.0</td>
<td>90.3 (130)</td>
<td>33.3 (48)</td>
<td>22.9 (33)</td>
<td>37.5 (54)</td>
<td>6.3 (9)</td>
<td>29.4 (8.7)</td>
<td>3.4 (.34)</td>
<td>0.0 (1.0)</td>
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</tbody>
</table>

*Note.* FT = Full-time Cohort, PT = Part-time Cohort, AS = Advanced Standing Cohort. ©2015 Author
Table 2.

Mean Number of Social Ties by Cohort

<table>
<thead>
<tr>
<th>Cohort</th>
<th>General Social Ties M (SD)</th>
<th>Academic Discussion M (SD)</th>
<th>Professional Influence M (SD)</th>
<th>Friendship M (SD)</th>
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</thead>
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<tr>
<td></td>
<td>t1 t2 t3</td>
<td>t2 t3</td>
<td>t2 t3</td>
<td>t2 t3</td>
</tr>
<tr>
<td>FT, A</td>
<td>.29 (.7)</td>
<td>10.4 (4.4)</td>
<td>11.6 (5.5)</td>
<td>9.0 (3.9)</td>
</tr>
<tr>
<td>FT, B</td>
<td>.36 (1.1)</td>
<td>8.8 (3.9)</td>
<td>11.3 ** (5.5)</td>
<td>6.3 (2.8)</td>
</tr>
<tr>
<td>FT, C</td>
<td>.36 (.7)</td>
<td>10.8 (5.3)</td>
<td>11.3 (5.9)</td>
<td>6.9 (4.7)</td>
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<tr>
<td>PT, D</td>
<td>.25 (.6)</td>
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<td>10.4 (6.1)</td>
<td>5.3 (3.1)</td>
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<tr>
<td>PT, E</td>
<td>.23 (.5)</td>
<td>8.3 (6.1)</td>
<td>10.0 ** (6.1)</td>
<td>6.4 (4.2)</td>
</tr>
<tr>
<td>AS</td>
<td>1.4 (1.9)</td>
<td>3.7 (1.8)</td>
<td>6.1 *** (2.5)</td>
<td>2.7 (1.4)</td>
</tr>
<tr>
<td>Total</td>
<td>.45 (1.0)</td>
<td>8.6 (5.1)</td>
<td>10.2 *** (5.7)</td>
<td>6.2 (4.0)</td>
</tr>
</tbody>
</table>

Note. FT = Full-time cohort, PT = Part-time cohort, AS = Advanced Standing cohort. Cohort differences on mean number of ties measured by Brown-Forsythe tests of equality of means indicated by †. **F(5, 51.478) = 3.653, p = .007; **F(5, 115.640) = 7.463, p < .001; **F(5, 123.547) = 3.363, p = .007; **F(5, 112.924) = 8.403, p < .001; **F(5, 123.182) = 4.649, p = .001; **F(5, 83.240) = 9.819, p < .001; **F(5, 88.618) = 6.228, p < .001. Significant changes from t2 to t3 measured by Related Samples Wilcoxon Signed Rank Tests indicated by *p < .05, **p ≤ .01, ***p ≤ .001. ©2015 Author
Table 3.

**Mean Number of Social Ties by Race/Ethnicity**

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>General Social Ties M (SD) t2</th>
<th>Academic Discussion M (SD) t2</th>
<th>Professional Influence M (SD) t2</th>
<th>Friendship M (SD) t2</th>
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</thead>
<tbody>
<tr>
<td>Black (n = 48)</td>
<td>9.1 (5.8)</td>
<td>6.2 (4.1) t2</td>
<td>4.5 (6.1) t2</td>
<td>3.1 (2.5) t2</td>
</tr>
<tr>
<td>Hispanic (n = 33)</td>
<td>7.4 (5.1)</td>
<td>5.3 (3.6) t2</td>
<td>4.1 (3.7) t2</td>
<td>2.9 (3.1) t2</td>
</tr>
<tr>
<td>White (n = 54)</td>
<td>9.0 (4.3)</td>
<td>6.6 (3.6) t2</td>
<td>4.7 (4.0) t2</td>
<td>3.7 (3.7) t2</td>
</tr>
<tr>
<td>Other (n = 9)</td>
<td>5.3 (3.6)</td>
<td>4.0 (3.3) t2</td>
<td>2.3 (2.2) t2</td>
<td>2.2 (1.3) t2</td>
</tr>
</tbody>
</table>

*Note.* Group differences on mean number of ties indicated by †. *F(3, 95.676) = 3.587, p = .017.* Significance of change from t2 to t3 was assessed with paired samples t tests for Black, Hispanic and White groups and are indicated by *p < .05, **p ≤ .01, ***p ≤ .001. ©2015 Author

Table 4.

**Change in Racial/Ethnic Homophily in Student Body, as Measured by E-I Indices**

| Type of Social Tie  | Change in E-I index Scores M (SD) t df Sig. Cohen’s d Effect Size |
|---------------------|---------------------------------------------------------------|-------------------------------------------------|
| General             | .09 (.36) 3.144 145 .002 .20                                   |
| Academic Discussion | .13 (.54) 2.836 138 .005 .23                                   |
| Professional Influence | .11 (.44) 2.897 141 .004 .20                                |
| Friendship          | .05 (.55) 1.017 124 .311 .07                                   |

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FIGURE 1. Network visualizations for general social ties among students. Symbol represents a student; shape and color represents the student’s race/ethnicity (see inset legend). Lines represent existence of a General Social Tie between two students and are weighted by the value of the tie (1-3). Students who are connected are placed closer to one another in the visualizations. The underlying structure of the cohorts can be detected in the clustering of students into six distinct groups, particularly in the end-of-semester visualization. In addition, cross-race/ethnicity ties can be noted by viewing individual pairs of students or by noting the distribution of various races/ethnicities throughout the visualization. © 2015 Author.