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Social network engineering and race in a police academy: A longitudinal analysis

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ABSTRACT

This research examined an attempt to facilitate racial integration by populating squads (i.e., workgroups) in a police academy with mixes of recruits that reflected the racial demographics of the larger cohort. This was part of the social infrastructure of the academy. Additionally, a fixed seating arrangement was considered as a second element of academy infrastructure capable of impacting racial integration. We examined the consequences of these academy components over time with regard to race by combining ethnographic accounts with social network data collected throughout the academy and using a variety of network analytic tools. These consequences with regard to race were examined as a part of social network evolution. The academy's social arrangements did accelerate the creation of social knowledge of recruits about each other and the formation of friendship ties both within and between races. However, our results point to clear limitations to such infrastructural engineering and have implications for both recruitment to police academies and dealing with race. They shed light also on processes of homophily and group composition over time and have implications for studying social networks.

1. Introduction: race in the police context

The conflict between the police and racial minorities has been one of the most serious problems facing urban law enforcement since its inception (Mann, 1993). In July 2009, the USA received a vivid reminder. "The arrest of Professor Henry Louis Gates Jr., the eminent Harvard scholar, at his own home thrust the police's treatment of minorities, particularly black men, back into the spotlight" (Blow, 2009). While minorities have been subjected to racial profiling for a long time (Weitzer and Tuch, 2002) the police–minority conflict extends into the occupational culture of policing itself. Specifically, most black officers report being victims of racial profiling (Barlow and Barlow, 2002) and share a perception that racist attitudes and institutional obstacles prevent full-participation within their departments (Bolton, 2003). However, with regard to professional fulfillment, blacks were found to be more satisfied with both their police careers and the organizational environment than their white and Hispanic colleagues (Friday and Friday, 2003; Lasley and Hooper, 1998). Such divergent findings paint a complicated picture of race relations both within police departments and for interactions between police and society. They also prompt us to question whether this situation can be altered by socializing recruits with regard to race while instructing them in the nuts and bolts of police work in police academies. More specifically, we wonder if increased contacts between recruits of different races can be used to increase understanding and to counteract racism within policing. We seek to answer these questions through an examination of one academy's attempt to bridge racial divides during their training regimen.

The presentation is organized in the following way. Section 2 outlines the substantive foundations through which we attempt to understand relation formation during training in a police academy. The areas upon which we draw are environments and elements of behavior (Homans, 1950), a phase model of police socialization (Conti, 2009), distinctiveness theory (McGuire, 1984) and homophily (McPherson et al., 2001). Section 3 describes our methods for data collection and analysis. Section 4 is devoted to detailing our empirical findings while our conclusions and policy recommendations are contained in Section 5.

2. Substantive foundations

As social relationships form in all organizations, one simple hypothesis is our start point.

Hypothesis 1. Social knowledge of recruits regarding each other increases throughout the course of the academy.

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This has a 'taken as given' status because it is hard to imagine the circumstances under which it would not be true. That it is supported (below) comes as no surprise. However, our *primary (orienting) thesis* is that the social relations among recruits not only change over time but do so in ways where race cannot be ignored when recruits are drawn from different racial categories.

Individuals joining organizations bring with them different bundles of talents, attitudes and general characteristics. While managers in organizations face issues of integrating diverse sets of people into effective working groups (Mehra et al., 1998), the history of policing in the United States cannot be ignored when training and managing police recruits. All organizations have a social infrastructure that facilitates and constrains training new members. While it is easy to claim this, Homans' (1950) focus on elements of behavior, together with his conceptualization of external and internal systems, suggests social mechanisms for relationship formation within organizations. Feld (1981) builds on this with his conception of foci as providing opportunities and constraints for creating social ties. Ideas from distinctiveness theory (McGuire, 1984) together with mechanisms of homophily (McPherson et al., 2001) provide further foundations for considering relation formation among a cohort of individuals entering an organization.

2.1. Environments and elements of behavior

Feld's (1981) focus theory helps us understand the interrelationship between the formation of recruit networks and the other aspects of an academy social structure. "In order to explain patterns in social networks, we need not look at causes of friendship but should concentrate our attention on those aspects of the extra-network social structure that systematically produce patterns in a network" (Feld, 1981: 1016). Feld's theory has roots in Homans' work and we recognize that any recruit cohort survives within its organizational environment through a set of adaptations. An external system forms through the interrelations between sentiment, activity, and interaction (Homans, 1950: 91). Sentiment includes a group's collective motivation (desire to be police) while activity is composed of the training steps taken to reach the collective goal. Interaction refers to the formally established work groups and channels of communication within the group. The relationships between these three elements (sentiment, activity and interaction) form the external system for a cohort of recruits and constrains their behavior. This system forms the core of the social infrastructure of all organizations including police academies.

The external system is part of the solution to any cohort's problem of surviving within its environment. In general, recruits assemble and enter the milieu of a police academy which contains multiple foci (described below). The collective sentiment for an entering cohort shifts from trying to *get into* the police academy to trying to *get out* of it successfully. While individuals may succeed or fail within this environment on the basis of their own performance, the training staff attempts to instill an ethos of teamwork among its recruits. As with medical students, "the size of the class prevents enterprising individuals or groups from obtaining advantages unavailable to the group as a whole" (Becker et al., 1963: 89).

Once a group establishes an external system enabling it to survive in its environment, this arrangement develops beyond its utilitarian origin to an elaboration of group behavior in an internal system (Homans, 1950: 109). By working together to endure their environment, a group establishes a set of inner dynamics paralleling those in its external system. As group members interact, as part of the external system, they develop sentiments towards one another. This internal system evolves and these practical interactions lead to personal sentiments. Homans argued that frequent interaction within the external system leads to sentiments of liking or approval within the group as part of the internal system. While both systems tend to have specific forms depending on the organizations within they are formed, those in police academies take special forms.

2.2. The phase model of police socialization

Typically, police training in the United States is structured with three distinctive phases: non-civilian, paramilitary, and anticipatory police (Conti, 2009). Each phase has its own goals and symbolic markers. The *non-civilian phase* is negotiated during training as the recruits move beyond the boundaries of their prior experience. In this phase, recruits must make their best case for acceptance by learning and conforming to the basic academy customs. The most significant training standards in this phase relate to demeanor (mainly with perpetual deference to academy staff and all police officers) and deportment (having a "squared away" appearance).

Once recruits internalize the training structure and can operate within an interaction order of strict obedience to authority without incident, the curriculum shifts to its *paramilitary phase*. To provide more specialized training (i.e. in using firearms, learning self-defense, developing pursuit driving skills, providing first aid, administrating CPR, etc.) it is customary for police academies to divide a cohort into subgroups called squads. These are working groups of cadets receiving the same training but at different times and places. When used and stressed, they are designed to create strong points of identification for recruits.

The *anticipatory police phase* of the academy is one where separate skills such as firearms training and self-defense are combined and mobilized together in specially constructed scenarios that mirror experiences faced by police in their work roles. The combinations of these practical events, coming late in training and just prior to final examinations and likely graduation, are designed so that recruits regard themselves more like real police officers and less like students.

For the last two phases of police socialization, squads serve as an integral part of the academy social infrastructure and are designed as an intense focus within which social relationships form as part of the external system. Recruits develop social knowledge about each other and it is reasonable to expect that feelings of friendship will develop as part of the internal system as it evolves in response to relationships formed in the internal system. With the academy as a primary organizational focus, we consider squads as new foci created within the academy. During academy training, a large amount of practical and procedural instruction – regarding the nature of law, operating rules in police departments, community policing and providing testimony in courts – is provided in formal lectures. If the seating arrangement is fixed by the academy for all recruits in lecture sessions, it has the potential to affect both the creation of social knowledge and generate friendships. We view this as another part of the social infrastructure of the academy and the external system helps drive relational tie formation in the internal system of police academies. Some hypotheses regarding the external system as social infrastructure follows:

Hypothesis 2. The development of both social knowledge and friendship are strongly conditioned by squad membership.

Hypothesis 3. To a lesser extent, a fixed seat arrangement also conditions the incidence of social knowledge and friendship.

We conjecture that effects of the academy social infrastructure are not uniform over time for two reasons. First, seat arrangement is likely to have more impact during the initial stages of the academy when there are much fewer social ties and the heavy emphasis on squads during the paramilitary phase implies that they will

have the most impact of tie formation in this phase. Second, while such design features exert an influence on relationship formation, endogenous social forces also operate. Relations beget relations: the formation of ties in the internal system has its own dynamic beyond that imposed by the social infrastructure of an organization.

Hypothesis 4a. The impact of the fixed seating arrangement will diminish over time.

Hypothesis 4b. The impact of squad membership will be strongest during the paramilitary phase.

2.3. Distinctiveness theory and homophily

According to McGuire (1984) people in a given social context show tendencies to identify with others who share a salient characteristic that is also somewhat rare in that context. Both minorities and women are relatively rare in police academies. Based on this line of thought, Mehra et al. (1998) conjectured that "The relative rarity of a social category in a particular social setting will promote members' use of that social category as a basis for friendship formation (1998: 442)" and found support for this hypothesis with regard to gender (for women) and race (for minorities). But race also matters for the majority. The social mechanisms for this involve both exclusionary identification pressures from majority members and joining together mechanisms for minority members. Homophily is "the principle that a contact between similar people occurs at a higher rate than among dissimilar people" (McPherson et al., 2001: 416) and these authors report that homophily patterns are remarkably robust across a wide variety of relationships and social divisions. This includes social knowledge and friendship, two relationships of primary concern in this study.

However, the detailed mechanisms for relation formation in organizations composed of people from different races are complex. McPherson et al. (2001: 420) report "baseline homophily within most opportunity structures leads Anglos to have much more racially homogenous networks than any other racial or ethnic group. African Americans and Hispanics fall at moderate levels of homophily, while smaller racial and ethnic groups have networks dominated by the majority groups." McPherson et al. report also that evidence from both school and adult studies suggest that African Americans reveal more inbreeding homophily than Anglos. To try and reconcile this difference between baseline homophily and inbreeding homophily they appeal, in part, to Feld's (1981) arguments by suggesting two possible mechanisms. One is that foci of activities are more segregated for small racial categories. The other is that minority groups actively generate within-category contacts to counteract pressures for forming relations with members of other racial categories. These conjectures are based on findings drawn from studies accepting organizations as they are and the compositions with regard to race within them. Their predictive value is less clear when an organization is proactive with regard to race, especially if attempts are made to make it irrelevant.

Of substantive relevance here is that the academy we studied tried to do something about race by constructing mixed-race squads. This attempt at social engineering had a major intent with important consequences. The training staff assigned recruits to four squads to approximate the demographic mix of the class with regard to race (and gender) in each squad. One training officer said that they did this because "some recruits have never been around people of other races before". Clearly, race was recognized as a major issue and some design features were intended to diminish its significance over the course of training. Success with social engineering is never guaranteed. Feld and Carter (1998) questioned its value in a discussion of desegregation in school systems and it is necessary to examine it here.

Race is a focus in Feld's terms with both significance theory and homophily ideas elaborating it. Making predictions about the *combination* of the effects of specially constructed social infrastructure and race is difficult. One reason is that the intended goal was *not* to design ways of combining actors with different attributes to achieve some organizational goal but to *eliminate* the relevance of these attributes in a quest to assert "we are all blue". The intent was to put people of different races into the same squads in the hope that this will overcome biased perceptions between people from the different racial categories and associated attitudes towards each other. An implied null hypothesis, as *the outcome of social engineering*, is that mixing squad membership in terms of race leads to no differences with regard to social relations among recruits across racial categories by the end of the academy training. However, such a claim is based on restricting attention to ties generated within squads and makes the implicit assumption that these outcomes, if real, generalize to a cohort as a whole. Given the importance of foci and homophily, there are reasons to doubt this claim and the following hypotheses seem more reasonable.

Hypothesis 5. Social knowledge and friendship within and between races will be stronger for pairs of recruits within the *same* squad than for pairs of recruits in *different* squads.

Hypothesis 6. For pairs of recruits in the same squad, levels of social knowledge and friendship will be higher within races than between races.

Hypothesis 7. For pairs of recruits in different squads, levels of social knowledge and friendship will be higher within races than between races.

Hypothesis 5 gives primacy to squads as foci while claiming that ties within and between members of racial groupings will both be raised within squads. Hypotheses 6 and 7 are consistent with the second conjecture of McPherson et al. (2001) that minorities also form within-category ties even when there are opportunities and pressures to form ties across racial categories.

If these hypotheses are correct, the academy can expect to have some success using its social infrastructure to deal with race in policing—but not to the point of having race be unrelated to friendship and the development of social knowledge in the entire cohort.

3. Methods

Given the historical salience of race in policing, we are compelled to examine its role in the formation of social knowledge and friendship ties. While there have been some of studies examining the experiences of women as a minority group within police academies (Fletcher, 1996; Haar, 2005; Prokos and Padavic, 2002) and others dealing with the affect of training on attitudes toward diversity (Chan, 1997; Chan et al., 2003; Gould, 1997; Rowe and Garland, 2003), fewer have dealt with the experiences of ethnic minority recruits (Alex, 1969; Cashmore, 2001; Ho, 2005), and none have addressed race relations within a cohort in any sort of detail.

We use a combination of ethnographic and social network analytic techniques, as complementary approaches, to understand the creation of relationships between recruits in a socialization process on a longitudinal basis. Some of the differences between squads in terms of the presence and magnitude of ties became more interpretable when qualitative information about observed behaviors of certain recruits at the end of the academy was used.

We study one recruit class in a major mid-Western American city where 72 recruits started a 21-week training regime during late-1999 and early-2000. Since the training curriculum for the

state in which this academy was located is set by an official commission, we assume that our setting is typical in comparison to the others under the same administration. Moreover, while some variation exists on a national scale, it is reasonable to generalize to many police academies since they tend to employ a similar model.

3.1. Data collection

Access to the site was achieved through a written request to the chief of police detailing a specific interest in police training and socialization. The department accommodated this request with the stipulation that the recruits' participation had to be voluntary. Recruit dossiers and other academy documentation were also made available. Ethnographic data were collected through participant observation over the course of training. The first author took an overt role during the academy and attended 70% of the class sessions. He was identified as a sociologist working on a research project. When questioned about the topic and his motives, he described a general interest in communication patterns easily verified by the social network questionnaires he asked the recruits to complete. Since it was a classroom environment, detailed observations were recorded without much notice. With the recruits taking notes, he was just another person writing in a notebook. In addition to observing as much of the formal training as possible, he went to great lengths to eat lunch frequently with the recruits and maintain a presence during their periodic breaks. This allowed him to observe and interact with the recruits at informal moments during which they could be more candid regarding their training experiences.

Our social network data were collected by using questionnaires at time points designed to coincide with each of the three phases of recruit socialization described above (T_1, T_2, and T_3). T_1 was at the beginning of the non-civilian phase, T_2 was during the paramilitary phase and T_3 occurred at the end the anticipatory police phase. These time points were evenly spaced during the academy. During the paramilitary phase, instruction within squads predominated. In the anticipatory police phase, the significance of the squads was diminished. All recruits spent most of their time in class taking pretests to prepare for their state certification exam.

Given the goal of obtaining social network data, none of the questionnaires could be completed anonymously. This was a serious planning issue. We mitigated it by dropping relational questions to which the recruits might react negatively and strongly. The initial questions were framed in terms of "knowing" other recruits rather than asking about friendship ties. For the last administration of a questionnaire (at T_3), we switched from asking about social knowledge to asking explicitly about friendship. Much as we wanted to collect data on positive and negative ties, we decided that even after 21 weeks, asking about negative ties would be too sensitive. In responding, recruits were free to use any number of choices. This was to avoid the measurement errors of fixed choice design pointed out by Holland and Leinhardt (1973). Even so, we were surprised that this type of error would have been huge had a fixed choice instrument been used. At the end of the academy session, the 68 recruits who finished training reported 1828 friendship ties (leaving 2728 null ties). The mean number of friendship ties reported per recruit is almost 27 with a median of 25. Considering both social knowledge and friendship ties at all time points there were 2474 non-null ties and 2082 null ties. Also, we attempted to gauge the relational strengths.

Recruits were made aware of the necessity of giving their name along with the other information in the cover letter for the questionnaire. When the instruments were administered, all academy staff left the classroom and the door was shut. Recruits were informed that their participation in this research was completely voluntary. Though optional, all questionnaires were returned with names and some even had badge numbers.

3.2. Variables

The main dependent (or predicted) variable, in matrix form, is the extent of social knowledge that recruits had of each other. This involves *possessing social knowledge* of others in the recruit environment and the being *known socially*. While this can be cast in the form individual attributes, our focus here is on the square relational array of social knowledge measured prior to the academy (T_0) and at two times, labeled T_1 and T_2, during the academy. Data on the pre-academy ties are retrospective and were collected at T_1. A 6-point scale with a zero point and 5 non-zero values was used to capture social knowledge. A list of all recruits was provided to all respondents.[1] At the end of the academy (T_3), we asked about friendship.[2]

Two predictor variables describing academy design were used. The four squads are labeled Squad 1 though Squad 4. Squad co-membership was treated as a relational array defined for the 68 recruits who made it though training. The second social infrastructure variable is the adjacency of a fixed alphabetical seating arrangement maintained throughout the academy when training was not done in the squads. This was also a matrix array. The final predictor used here concerns race where the cohort distribution was Caucasian (67%), African American (23%), Latino (9%) and there was one Asian recruit. As two of these minority groups were small, this distribution was converted to 'White' and "Non-white" where, for pairs of actors, the element 1 in the relational matrix represents membership in the same race category and the element 0 corresponds to membership in different race categories. Race specific joint membership arrays were also constructed for the academy as a whole and for each squad. We recognize that using race defined this way is a less than optimal strategy given the known differences with regard to homophily for African Americans, Latinos and Asians but membership for two of the categories was small. This introduces some complications when interpreting our results. Too few women were in the class to merit an analysis in terms of gender.

The academy held an early 'diversity training session' as part of the curriculum intended to generate sensitivity regarding race and law enforcement. Scenarios showing appropriate police responses to 'typical' events that could occur were presented. At the end of the academy, a second such session was held at another location (a community college) remote from the academy and run by instructors *not* drawn from the roster of academy staff.

Some of our conclusions are complicated by two items:

1. Our decision to change from asking about social knowledge to asking about friendship at T_3. It is reasonable to regard 'being friends with' someone as a stronger tie than merely 'knowing' them. This is reflected in lower values – but not incidence – for friendship ties compared to social knowledge ties. We did not measure both at T_3 and we only speculate that social knowledge

[1] For pre-academy social knowledge, the recruits responded to "Please indicate which of [these] individuals you knew prior to the start of your training. Use the 1–5 scale provided to indicate how well you know them." The non-null extremes of the response range were "acquainted with them, but did not know them well" and "know them extremely well". The zero is defined as having not knowing another recruit at all. While individuals applying to the academy were scattered across the city (with some coming from the surrounding state and some from outside the state), the entering cohort was not just a set of unconnected individuals. Some relations existed among the recruits prior to their entry into the academy and take the form of 'pre-academy' social knowledge. A similarly worded question was used for social knowledge during the academy using the present tense.

[2] The non-null extremes for 5-point responses were 5 (for "a recruit is among your very best friends within the class") and 1 (for "[a recruit who] is a friend but you are not that close to them"). The zero value (relation) for this item was specified by "if you do not know a particular recruit very well or are not friends with him of her, please skip over his/her name".

at T_3 was higher than it was at T_2. Also, if increased social knowledge promotes friendship, friendship levels were most likely higher at the last time point than they were at T_2. This implies caution in comparing social knowledge at T_2 and friendship at T_3.
2. While the academy attempted to construct squads with the same demographic mix of races in the recruit cohort, they were unsuccessful.

3.3. Data analysis

Rather than use a single data analytic approach, we used different analysis in the following sequence. Table 1 presents results from bootstrapped paired *t*-tests to show the growth in social knowledge throughout the academy and friendship levels at the end of the academy. This is coupled to the phases of police training. Table 2 presents dynamic longitudinal results from using quadratic assignment regression (Dekker et al., 2007) to link the distributions of social relations *at different points in time* to each other, to the social infrastructure and to race. In Table 3 we report results from using robust ANOVA methods (Snijders and Borgatti, 1999) to examine in a more detailed fashion the differences within and between squads of levels of social knowledge and friendship. Table 4 extends these results for a simultaneous consideration of squad membership and race. The complexities of the results in Table 4 led us to use QAP regression with interaction terms even though our hypotheses did not specify interaction terms. Table 5 presents these subtle and more complicated results for race, squads, adjacency and interactions of squads and seating with race. Table 6 presents some further results for academy social infrastructure and race. All analyses use data from the questionnaire items described above. With 68 recruits, there are 4556 directed dyadic ties between these recruits (including null ties). We also consider ethnographic data surrounding the second diversity training session at the end of anticipatory police phase of training to augment the quantitative analyses. The quantitative analyses were done with UCINET (Borgatti et al., 2002).

4. Empirical results

Before presenting empirical results reporting tests of our hypotheses, we document that the three phases of police socialization, as described above, were present in this police academy. As early as their second day of training in the academy, the department's psychological counselor stressed the distinction between the world left behind and the one they were entering. She told the class that they were "no longer normal" and they did not "own [their] lives anymore." Despite being outside of the civilian experience, recruits had not secured a stable position within the occupational culture. The training staff emphasized this point by stressing "This is a family. It's an awesome family. You are not part of this family! Right now you are orphans, and you are trying to get adopted." This is typical for the non-civilian phase. Following this, the formation of squads was an integral part of the paramilitary phase. Each squad had a name, an elected leader, and a flag that they carried while marching in formation or running. A strong sense of competition between the squads was encouraged. When one advanced more quickly through an element of training, other squads expressed a strong motivation to catch up with the more successful squad. Conversely, when one squad had a disproportionate number of its members failing to meet some training standards, its members had a collective sense of shame. Also, punishments for rule violations were frequently distributed on a collective basis to those squads having detected violations committed by any member.

As training moved towards its conclusion, recruits became acutely aware of being very near their new role as police officers. Instructors created exercises such as building search scenarios during which recruits were armed with flashlights, handcuffs and service weapons that fired paint filled pellets. They were sent into an abandoned building at night to find an instructor playing the part of an armed suspect. This shift towards a police identity was apparent in statements where recruits would *knowingly* talk of "the street" as if they had directly experienced it in qualitatively different ways than other urban residents. This sense of difference from civilians shaded into the notion of being superior to civilians as revealed in the late session on diversity training that we describe in Section 4.2.

While ethnographic evidence was collected throughout the course of training, the network data were collected at three time points with each time point occurring in a distinct phase of the academy training. Confirmation that these phases were present justifies the design for the timing of data collection for gathering information on social ties formed during the academy.

4.1. Evolution of social knowledge and friendship

The predicted variables are social knowledge (at T_1 and T_2) and friendship (at T_3). Both are considered in binary and valued forms. The predictor variables are race and two features of academy social infrastructure (squads and seating). We test the seven hypotheses stated above.

Table 1 contains four panels: the top two panels report results for the binary (presence of) ties. The bottom two panels report results using the valued ties (for all pairs of recruits). Both are relevant insofar as we are interested in the frequency (existence) of ties and their magnitudes over time. Table 1A shows the increase of non-null ties across all four time points. The binary densities, shown in Table 1B, also increase over time. For social knowledge, these are 0.041 (pre-academy, T_0), 0.191 (T_1) and 0.393 (T_2). From the bootstrap paired *t*-tests, each change is significant (at levels well beyond $\alpha = 0.05$) for a null hypothesis claiming no changes between time points. Hypothesis 1 is supported. As shown in the last row, while the mean level of friendship ties at T_3 exceeds the mean level of social knowledge at T_2, this small difference is insignificant. Means for valued ties are in the bottom two panels of Table 1. For social knowledge, these means increase from 0.119 (T_0) to 0.582 (T_1) to 1.181 (T_2). All changes are significant ($p < 0.05$) and support Hypothesis 1. The friendship mean at T_3 is lower than the mean social knowledge at T_2 but this difference is also insignificant.

A simple approach to gauge the accumulation of social ties during the academy uses quadratic assignment (QAP) regression to predict social knowledge and friendship from academy social infrastructure, race *and* relations for earlier time points. Table 2 shows these results. The null hypothesis for each regression, as a whole, is that the set of variables have no predictive value. This is rejected ($p < 0.001$) for each time point. The null hypotheses, for each regression, state that the coefficients for all individual predictors are zero. With one exception, these are rejected (with *p*-values ranging from 0.031 to less than 0.001). Table 2A shows that social knowledge at T_1 is predicted by both social infrastructure variables and race while controlling for pre-academy social knowledge. The most potent predictor is squad membership. The least predictive is race. Hypotheses 2 and 3 are supported. Table 2B shows that social knowledge at T_2 is predicted by both infrastructure variables while controlling for pre-academy social knowledge and social knowledge at T_1. However, race is not significant. This provides suggestive evidence that some effects of race may have been diminished regarding social knowledge formation. The unstandardized coefficient for squad membership increased while the corresponding coefficient for seating arrangement declined. Again, Hypotheses 2 and 3, as well as Hypotheses 4a and 4b, are supported. For the paramilitary phase of training, squad membership is the most

Table 1
Change over time of the number of ties and their magnitude for social knowledge and friendship.

Time point	Number of ties	Density		
A. Number of ties and tie density (binary)				
T_0	188	0.041		
T_1	869	0.191		
T_2	1790	0.393		
T_3	1828	0.401		
Time points	**Density change**	**Bootstrap standard error**	**95% bootstrap confidence interval**	**Bootstrap *t*-statistic**
B. Differences over time in ties (binary)				
T_0 to T_1	0.149	0.013	[0.124, 0.175]	11.33
T_1 to T_2	0.202	0.019	[0.164, 0.241]	10.34
T_1 to T_3	0.211	0.022	[0.168, 0.253]	9.71
T_2 to T_3	0.008	0.022	[−0.035, 0.051]	0.38
Time point	**Number of ties**	**Mean**		
C. Mean level of valued ties over time				
T_0	188	0.119		
T_1	869	0.582		
T_2	1790	1.181		
T_3	1828	1.123		
Time points	**Mean change**	**Bootstrap standard error**	**95% bootstrap confidence interval**	**Bootstrap *t*-statistic**
D. Difference in means over time				
T_0 to T_1	0.463	0.043	[0.379, 0.547]	10.85
T_1 to T_2	0.599	0.061	[0.479, 0.719]	9.78
T_1 to T_3	0.541	0.072	[0.400, 0.681]	7.56
T_2 to T_3	−0.058	0.064	[−0.184, 0.068]	−0.91

potent predictor of social knowledge. The second most potent predictor is social knowledge at the previous time point suggesting an *endogenous social process* of relationship formation was at work also. Table 2C reports the results for T_3, the final time point, at the end of the anticipatory police phase. All predictors are significant. In this anticipatory police phase, race returns as a significant but modest predictor. So is the fixed seating arrangement. The potent predictors are the indicators of *prior social knowledge at all time points*. While social knowledge at each time point is conditioned by the social infrastructure of the academy, the social infrastructure fades in potency as a direct predictor of friendship compared to the endogenous generation of relations.

We now to consider the ties within and between squads at each time point. Table 3 shows the mean levels of these ties together with summary information giving the fit of the 'structural blockmodel' to the square relational data where positions are defined by squad membership. The null hypothesis claims there are no mean differences. For this model, the reference category (cell) corresponds to the ties inside Squad 4. (The intercept is the tie density for this cell for social knowledge with the estimated parameters

Table 2
Simple quadratic assignment regression results for each time point.

Predictor	Unstandardized coefficient	Standardized coefficient	*p*-Value
A. Predicting social knowledge at T_1			
Intercept	0.116	–	–
Pre-academy social knowledge	0.530	0.265	<0.001
Seating arrangement	0.695	0.152	<0.001
Squad membership	1.024	0.337	<0.001
Race	0.177	0.068	<0.001
		$R^2 = 0.23$, $p < 0.001$, $N = 4556$	
B. Predicting social knowledge at T_2			
Intercept	0.455	–	–
Pre-academy social knowledge	0.260	0.102	<0.001
Social knowledge at T_1	0.417	0.326	<0.001
Seating arrangement	0.322	0.055	<0.001
Squad membership	1.606	0.413	<0.001
Race	0.073	0.022	0.129
		$R^2 = 0.42$, $p < 0.001$, $N = 4556$	
C. Predicting friendship at T_3			
Intercept	0.361	–	–
Pre-academy social knowledge	0.127	0.053	0.001
Social knowledge at T_1	0.159	0.132	0.000
Social knowledge at T_2	0.394	0.420	0.000
Seating arrangement	0.201	0.037	0.004
Squad membership	0.442	0.121	0.000
Race	0.119	0.038	0.031
		$R^2 = 0.36$, $p < 0.001$, $N = 4556$	

Table 3
Tie densities and tie means of social relations within and between squads.

	Squad 1	Squad 2	Squad 3	Squad 4
A. Pre-academy social knowledge (at T_0)				
Squad 1	0.224	0.022	0.124	0.208
Squad 2	0.018	0.075	0.035	0.033
Squad 3	0.108	0.035	0.245	0.131
Squad 4	0.197	0.051	0.160	0.210
	Structural blockmodel: $R^2 = 0.02$, $p = 0.052$			
B. Social knowledge (at T_1)				
Squad 1	**1.371**	0.349	0.265	0.266
Squad 2	0.430	**1.712**	0.299	0.335
Squad 3	0.186	0.194	**1.163**	0.330
Squad 4	0.332	0.327	0.556	**1.460**
	Structural blockmodel: $R^2 = 0.14$, $p < 0.001$			
C. Social knowledge (at T_2)				
Squad 1	**2.835**	0.621	0.405	0.408
Squad 2	1.221	**3.287**	0.632	0.735
Squad 3	0.350	0.316	**2.405**	0.755
Squad 4	0.834	0.735	1.190	**2.665**
	Structural blockmodel: $R^2 = 0.32$, $p < 0.001$			
D. Friendship (at T_3)				
Squad 1	**2.298**	1.011	0.634	0.765
Squad 2	1.018	**2.183**	0.406	0.676
Squad 3	0.588	0.431	**2.147**	0.801
Squad 4	0.934	0.805	1.232	**2.301**
	Structural blockmodel: $R^2 = 0.18$, $p < 0.001$			

being the differences between this intercept and the means in the corresponding cells.) The analyses were all done with 5000 permutations to provide *p*-values for these parameters in the form of a permutation test. For T_0, the robust ANOVA model explains less than 2 percent of the variance and is not significant. The means of social knowledge at the beginning of the academy do not differ within or between the squads, a result making eminent sense.

The second panel of Table 3 provides tie means for social knowledge within and between squads at T_1. *All* means in this panel are larger than the corresponding values for T_0. The structural blockmodel ANOVA, with positions defined by squad membership, explains 14 percent of the variance ($p < 0.001$). *None* of the diagonal densities differ from the value of the reference category ($0.10 \leq p$-values ≤ 0.32). They are bolded in this panel. *All* of the off-diagonal (between squads) means are significantly smaller than for the reference category ($p < 0.001$). Hypothesis 5 is supported at T_1 for social knowledge.

Prior to T_2, nearly all of the instruction took place within squads and, consistent with this more intense working environment, the simple structural blockmodel defined by squad membership, accounts for 32% of the variance ($p < 0.001$). The mean in every cell has risen compared to T_1. Again, *all* of the other diagonal cells are not significantly different from that of the reference category ($0.17 \leq p \leq 0.30$). The diagonal values in the table are bolded to stress this. Moreover, the mean in *every* off-diagonal cell, for ties between squads, is significantly less than for the reference category ($p < 0.001$). These results support Hypothesis 5 at T_2 for social knowledge. The first three panels of Table 3 show the increasing social knowledge through time and, for the valued ties, that the social knowledge is far higher for pairs of the recruits within the same squad than for pairs of recruits in different squads. Consistent with the Hypothesis 1, bootstrap methods of paired *t*-tests revealed all means of social knowledge at one time point as significantly higher that at the prior time point within all four squads.

Given that 'friendship' is a stronger tie than merely 'knowing' someone, it is not surprising that mean levels of friendship at T_3 are lower in all of the diagonal cells than the means of social knowledge for T_2. All of the off-diagonal cells for Squad 3 also show such drops for friendship at T_3 relative to social knowledge at T_2. In contrast, the means in the remaining off-diagonal cells (for Squads 1, 2 and 4) increase slightly. The simple structural blockmodel accounts for 18% of the variance in friendship ties ($p < 0.001$). *None* of the densities in the other diagonal cells are significantly different from that of the reference category ($0.30 \leq p \leq 0.50$) and *all* of the off-diagonal means are significantly smaller ($p < 0.001$) than for the reference category. This provides support for Hypothesis 5 for friendship. We used bootstrap methods for paired *t*-tests to determine if the levels of friendship within each squad were significantly lower at T_3 compared to the mean levels of social knowledge at T_2. The null hypothesis of no difference between time points is rejected for two of the squads. For Squad 1, the mean friendship at T_3 is significantly is lower than the mean social knowledge at T_2 (with a bootstrapped *t*-statistic of -2.81). The same is true for Squad 2 with a bootstrapped *t*-statistic of -5.04. However, this is not the case for the remaining squads. (The bootstrapped *t*-statistics are -1.19 and -1.41 for Squads 3 and 4, respectively.)

Visual evidence of the potent effect of squad membership on the generation of social knowledge is shown in the formatted matrix of social knowledge ties for T_2 in Fig. 1. Rows and columns are organized to group squad members together. The lines extending beyond the boundaries of the array mark the boundaries between squads. The clumps on the main diagonal reveal far denser ties within squads than between squads. The corresponding figures for T_1 and T_3 show the same pattern of clumping albeit with different densities.

Having shown strong squad effects on the formation of social relations in the academy, we turn to consider squad membership and race jointly. Table 4 contains the mean levels of social knowledge by squad *and* race at T_1 and T_2 (in the top two panels) with the corresponding mean levels of friendship at T_3 in the bottom panel. (There are no significant differences in mean levels for pre-academy social knowledge and these are not reported.) In fitting the robust

Table 4
Means of social relation ties by squads and race during the academy.

	Squad 1		Squad 2		Squad 3		Squad 4	
	White	Non-White	White	Non-White	White	Non-White	White	Non-White
A. Social knowledge (at T_1)								
Squad 1								
White	**1.652**	1.100	0.315	0.250	0.228	0.028	0.225	0.214
Non-white	0.983	**1.500**	0.244	0.829	0.347	0.867	0.140	0.714
Squad 2								
White	0.407	0.578	**2.694**	*1.429*	0.407	0.222	0.367	0.444
Non-white	0.214	0.829	0.825	**1.690**	0.133	0.524	0.143	0.408
Squad 3								
White	0.194	0.253	0.296	0.086	*1.271*	*1.222*	0.407	0.257
Non-white	0.056	0.000	0.074	0.238	0.711	0.333	0.167	0.381
Squad 4								
White	0.358	0.300	0.244	0.371	0.607	0.533	**1.556**	**1.471**
Non-white	0.131	0.771	0.302	0.449	0.457	0.714	1.000	**2.000**
Structural blockmodel: $R^2 = 0.17$, $p < 0.001$								
B. Social knowledge (at T_2)								
Squad 1								
White	**3.197**	**2.600**	0.648	0.524	0.328	0.056	0.317	0.238
Non-white	**2.383**	**2.500**	0.356	1.114	0.640	1.000	0.240	1.371
Squad 2								
White	1.620	1.022	**3.472**	**3.349**	0.793	0.481	0.922	0.635
Non-white	0.607	1.714	**2.873**	**3.500**	0.457	0.667	0.514	0.837
Squad 3								
White	0.283	0.507	0.393	0.200	**2.462**	**2.756**	0.640	0.848
Non-white	0.333	0.400	0.148	0.619	*1.956*	1.167	0.667	1.238
Squad 4								
White	0.833	0.980	0.833	0.743	1.267	1.300	**2.489**	**2.571**
Non-white	0.631	1.114	0.571	0.755	1.048	1.190	**2.671**	**3.190**
Structural blockmodel: $R^2 = 0.34$, $p < 0.001$								
C. Friendship (at T_3)								
Squad 1								
White	**2.727**	**1.683**	0.972	0.595	0.544	0.250	0.658	0.476
Non-white	**1.833**	**2.700**	*1.111*	**2.000**	0.907	*1.267*	0.900	**1.629**
Squad 2								
White	*1.287*	0.911	**2.861**	**2.333**	0.459	0.222	0.844	0.524
Non-white	0.667	*1.171*	*1.254*	**2.190**	0.362	0.524	0.343	1.041
Squad 3								
White	0.417	0.720	0.370	0.286	**2.086**	**2.022**	0.687	0.790
Non-white	0.889	*1.267*	0.593	**1.333**	**2.600**	**1.833**	0.800	**1.667**
Squad 4								
White	1.000	0.800	0.933	0.543	*1.380*	1.000	**2.556**	**2.286**
Non-white	0.631	*1.629*	0.651	1.143	1.038	*1.476*	**1.957**	**2.357**
Structural blockmodel: $R^2 = 0.22$, $p < 0.001$								

Note: The compositions of squads were: Squad 1 (12 White, 3 Black, and 2 Latino recruits); Squad 2 (9 White and 7 Black recruits); Squad 3 (15 White, 2 Black and 1 Latino recruits); Squad 4 (10 White, 3 Black, 3 Latino and 1 Asian recruits).

ANOVA structural blockmodel, the ties among non-whites in Squad 4 form the reference category. The bolded items are not significantly different from that of the reference category ($0.07 \leq p \leq 0.22$) and the italicized items are not significantly different from the reference category when the cut-off criterion, α, is set at 0.01. The remaining elements in the top panel are all significantly smaller than for the reference category with p-values well below 0.01 (for most, $p < 0.001$). We know from the results shown in Table 3 and Fig. 1 that social knowledge builds up mainly within squads. For every squad, all of the internal means are higher than the means for ties between squads. The *within-race means are, by far, the highest* in both Squads 1 and 2 ($p < 0.01$) supporting Hypothesis 5. Using $\alpha = 0.01$ as the cut-off, the white-to-non-white ties have the next highest, and noteworthy, mean inside Squad 2. In Squad 4, *within-race means are, again, the highest* and support Hypothesis 6. Squad 3 is different: both the white-to-white and white-to-non-white ties are very high. The low mean for the ties among non-whites within this squad at T_1 is anomalous and merits further consideration. This is provided below.

We wrote earlier that the academy attempted to populate the squads in proportion to the representation of races among the recruits. For the 68 graduating recruits, the academy did not succeed: Squad 1 had 12 White, 3 Black and 2 Latino recruits; Squad 2 had 9 White and 7 Black recruits; Squad 3 had 15 White, 2 Black and 1 Latino recruit while Squad 4 had one Asian, 3 Black, 3 Latino and 10 White recruits. Squad 3 has the fewest non-white recruits and the rows for them in this squad are nearly empty which is reflected in the low means in the second row of internal Squad 3 means.

The second panel of Table 4 shows results for social knowledge ties at T_2. Again, the reference category is the cell for within non-white ties in Squad 4 and the coefficients, one for each cell, give the difference between that cell and the reference category. Bolded

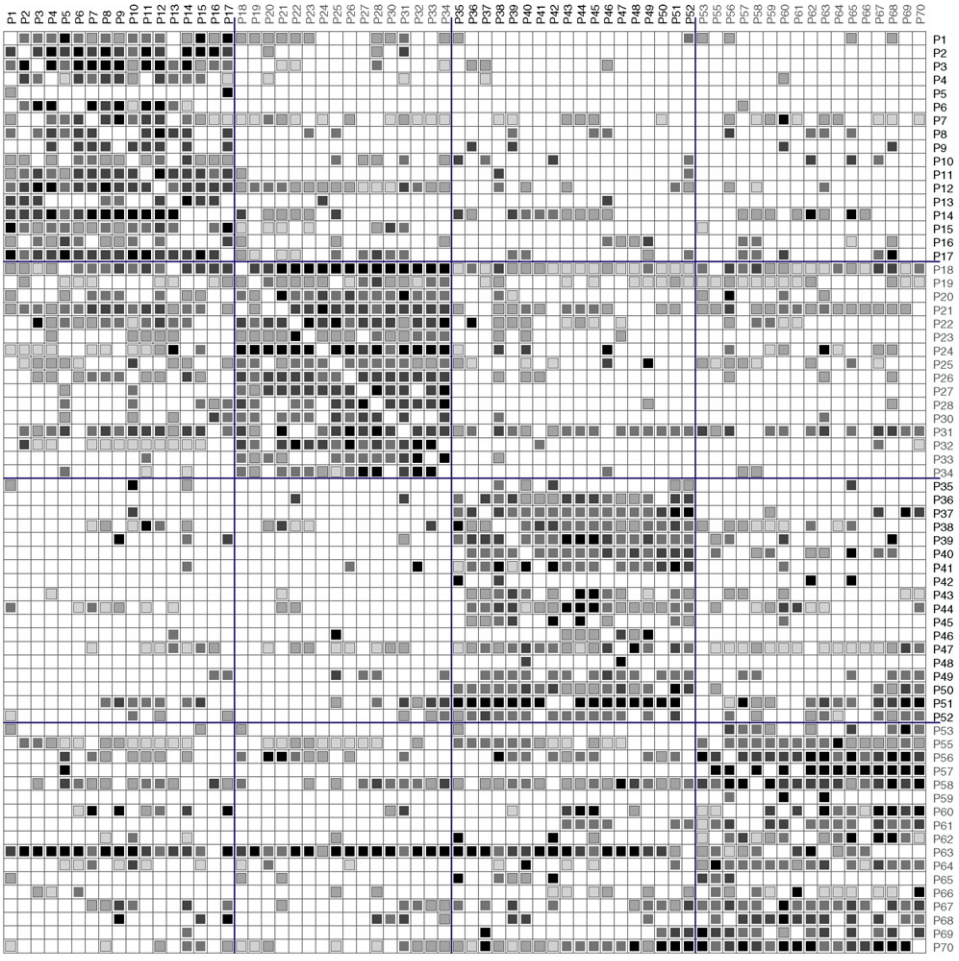
Table 5
Quadratic assignment regressions for predicting social by using squad membership, adjacency and interactions with race.

Predictor	Unstandardized coefficient	Standardized coefficient	p-Value
Social knowledge at T_1			
Intercept	0.248	–	–
Seating arrangement	**0.669**	**0.146**	**<0.001**
Squad membership	**1.257**	**0.414**	**<0.001**
White–non-white (WN)	−0.021	−0.007	0.363
Non-white–non-white (NN)	0.204	0.049	0.069
Non-white–white (NW)	−0.029	−0.009	0.414
Interaction: Seating and WN	0.014	0.002	0.446
Interaction: Seating and NN	**0.718**	**0.052**	**0.007**
Interaction: Seating and NW	−0.048	−0.005	0.393
Interaction: Squad and WN	**−0.204**	**−0.036**	**0.039**
Interaction: Squad and NN	−0.034	−0.004	0.436
Interaction: Squad and NW	**−0.618**	**−0.103**	**<0.001**
		$R^2 = 0.17$, $p < 0.001$, $N = 4556$	
Social knowledge at T_2			
Intercept	0.624	–	–
Seating arrangement	**0.547**	**0.094**	**<0.001**
Squad membership	**2.092**	**0.538**	**<0.001**
White–non-white (WN)	−0.104	−0.027	0.104
Non-white–non-white (NN)	0.325	0.062	0.068
Non-white–white (NW)	−0.044	−0.011	0.418
Interaction: Seating and WN	**0.315**	**0.027**	**0.049**
Interaction: Seating and NN	0.401	0.023	0.076
Interaction: Seating and NW	−0.041	−0.003	0.413
Interaction: Squad and WN	0.096	0.013	0.242
Interaction: Squad and NN	0.013	0.001	0.481
Interaction: Squad and NW	**−0.168**	**−0.022**	**0.106**
		$R^2 = 0.31$, $p < 0.001$, $N = 4556$	
Friendship at T_3			
Intercept	0.665	–	–
Seating arrangement	**0.605**	**0.110**	**<0.001**
Squad membership	**1.678**	**0.460**	**<0.001**
White–non-white (WN)	−0.085	−0.023	0.179
Non-white–non-white (NN)	**0.564**	**0.114**	**0.005**
Non-white–White (NW)	0.076	0.020	0.341
Interaction: Seating and WN	−0.133	−0.012	0.267
Interaction: Seating and NN	0.581	0.035	0.025
Interaction: Seating and NW	−0.225	−0.019	0.119
Interaction: Squad and WN	−0.150	−0.022	0.135
Interaction: Squad and NN	**−0.643**	**−0.067**	**0.001**
Interaction: Squad and NW	**−0.598**	**−0.083**	**<0.001**
		$R^2 = 0.19$, $p < 0.000$, $N = 4556$	

means are not significantly different from the reference category ($0.06 \leq p$-value ≤ 0.38) and, for $p < 0.01$, the italicized means are not significantly less than for the reference category. (The mean for ties from non-white-to-white in Squad 3 has a p-value of 0.018.) In Squads 1, 2 and 4, *all four internal means are, by far, the highest* in their rows which implies that, during the paramilitary phase, social knowledge grew within these three squads far more than social knowledge for pairs of recruits in different squads supporting Hypothesis 5. Squad 3 again differs: while the mean white-to-white and white-to-non-white means are at levels comparable to those

Table 6
Levels of social knowledge and friendship within and between races as predicted by squad membership and seat adjacency.

	Same squad and adjacent	Same squad and not adjacent	Different squads and adjacent	Different squads and not adjacent
T_1 social knowledge				
White-to-white	2.173	1.505	0.916	0.248
Non-white-to-non-white	3.062	1.675	1.839	0.452
White-to-non-white	1.478	0.858	0.839	0.219
Non-white-to-white	1.962	1.280	0.910	0.227
T_2 social knowledge				
White-to-white	3.262	2.715	1.170	0.624
Non-white-to-non-white	4.000	3.053	1.896	0.949
White-to-non-white	3.010	2.504	1.086	0.580
Non-white-to-white	3.569	2.707	1.381	0.519
T_3 friendship				
White-to-white	2.950	2.345	1.270	0.665
Non-white-to-non-white	3.451	2.266	2.415	1.229
White-to-non-white	2.202	1.822	1.121	0.741
Non-white-to-white	2.583	2.110	1.053	0.580



Note: The blue lines extending beyond the boundary of the box mark the four squads. The magnitudes of the ties are indicated by the darkness of the squares that range from black (values of 5) to light grey (values of 1). White squares denote the absence of ties between pairs of recruits.

Fig. 1. Social knowledge levels at T_2 with squad members placed together. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

in the other squads, the ties from non-whites to both whites and non-whites in this squad are lower.

The results in Table 4 concerning social knowledge show Hypothesis 5 is supported in Squads 1, 2 and 4. However, it is only partially supported in Squad 3. According to the top panel of Table 4, this increase in social knowledge at T_2 primarily occurred within races in Squads 1, 2 and 4. It is of some interest that only in Squad 4 is there a significant ($p < 0.01$) level of social knowledge among whites about non-whites and this is the most varied squad with regard to composition by race. The second panel of Table 4 is unequivocal regarding support for Hypotheses 5 and 6 in Squads 1, 2 and 4: within and between race means of social knowledge are significantly higher within squads. Support is less strong within Squad 3. Indeed, the ties among the non-white recruits in that squad provide contradictory evidence.

The bottom panel of Table 4 shows the mean levels, by squad and race, for friendship at T_3 (at the end of the academy). We use the same convention regarding bolded, italicized and unmarked means in this panel. All four internal mean levels of friendship inside Squads 1, 3 and 4 are bolded to emphasize they are large and noteworthy ($p < 0.01$). Three of the four internal means for Squad 2 are bolded and the fourth is italicized. Clearly levels of friendship are higher within squads. Hypothesis 7 is supported. However, there are some other high means for ties between squads that are noteworthy ($p < 0.01$). These are: (i) the mean levels of friendship for non-whites in Squad 1 with non-whites in Squads 2 and 4 and (ii) the mean levels of friendship for non-whites in Squad 3 with non-whites in Squads 2 and 4. These feature ties involving non-white recruits in *different* squads. If we use $\alpha = 0.01$, then to this list of high means for friendship between squads we can add the following: (i) the mean for ties from non-whites in Squad 2 to non-whites in Squad 1; (ii) the mean for ties from non-whites in Squad 3 to non-whites in Squad 1; (iii) the mean for ties from non-whites in Squad 4 to non-whites in Squads 1 and 3; (iv) the mean for ties from non-whites in Squad 1 to whites in Squad 2. All but the last are means for non-white recruits in different squads. These support Hypothesis 7. There are systematic differences for squad membership by race even though characterizing them is not straight forward.

These interpretations require further consideration because of the differing composition of the squads. Some plausible speculations suggest that squad *composition* works as a social mechanism.[3]

[3] For these observations we are indebted to insightful reviewer comments.

For example, it seems reasonable that social knowledge and friendship would be higher for the 7 *blacks* in Squad 2 than for the 7 *non-whites* in Squad 4. Implicit is the idea that greater ethnic diversity makes the generation of social knowledge harder. The mean among black recruits (3.5) in Table 4B is higher than the mean for non-whites in Squad 4 (3.19). This is suggestive. And the presence of white recruits is highest in Squad 3. It seems that numbers matter. Further, the 3 non-whites in the squad come from two races. The mean level for ties within the non-whites in Squad 3 is consistently low for all time points. For friendship, the lowest mean among non-whites in Squad 3 (Table 4C). Squad 2 differs by being the closest to parity for the presence of white and black recruits. Yet the mean for non-whites (blacks in this squad) is the second lowest for friendship implying internal homogeneity need not imply greater friendship. It follows that the differential squad composition acts to confound an unambiguous statement regarding support for Hypotheses 6 and 7.

Even so, it is seems that joint squad membership, at least in this paramilitary training environment, works to generate increased levels of social knowledge and friendship within squads for recruits both within and between races. If this constitutes success, the downside is that this structural arrangement does not apply to nearly the same extent for pairs of recruits in different squads. Of the potential 4556 dyads ties, there are 1398 pairs of recruits between whom social knowledge and/or friendship relations never form. Of these always null ties, *only 18 occur within* squads. This provides further powerful indirect support for Hypotheses 5 and 6.

The results for friendship at T_3 merit closer attention because they reflect friendship levels at the end of the academy when the second (late) session on diversity was held (see also Section 4.2). The means shown in the third panel of Table 4, and the inferences based on them, come from analyses of the network as a whole. We also fitted some quadratic assignment (QAP) regressions for each squad for T_3 with friendship levels as the predicted matrices and used three predictor matrices. There were binary matrices for non-white-to-non-white ties, non-white-to-white ties and white-to-non-white ties. The white-to-white ties formed the omitted category. For each squad, the fitted means are those shown in the diagonal blocks in the third panel in Table 3. These QAP regressions permit some more refined inferences within squads. For Squads 3 and 4 these are no significant differences for the four means. But for Squads 1 and 2 there are significant differences that appear noteworthy. The QAP regression for Squad 1 is significant (with $R^2 = 0.07$, $p = 0.007$). The mean (1.68) of the white-to-non-white ties is significantly smaller than the white-to-white tie mean of 2.73 ($p = 0.006$ from a permutation test). The QAP regression for Squad 2 is also significant ($R^2 = 0.13$, $p = 0.004$) with non-white-to-white mean (1.25) significantly less than the white-to-white mean of 2.86 ($p = 0.007$).

Having considered the impact on squad membership on the development of social knowledge and friendship, we now include seat adjacency of the social infrastructure the academy. Table 5 presents the results of using quadratic assignment regression (QAP) including adjacency. Again, this method returns robust results in the presence of network autocorrelation. Because of the complexities of the results shown in Table 4, we specified some interaction terms even though none were present in the hypotheses. The matrices featuring race are as follows (with ties from white recruits to white recruits is the omitted relation): (i) white-to-non-white ties (WN), non-white-to-non-white ties (NN) and non-white-to-white ties (NW); (ii) interactions of these matrix variables with seat adjacency; (iii) interactions of them with squad membership.

More specifically, letting y denote the predicted variable (either social knowledge or friendship) in matrix form for the QAP regressions, the basic model can be expressed as:

$$y = \beta_0 + \beta_1\, adjacency + \beta_2\, squad + \beta_3\, WN + \beta_4\, NN + \beta_5\, NW + \beta_6\, adjacency \times WN + \beta_7\, adjacency \times NN + \beta_8\, adjacency\, t \times NW + \beta_9\, squad \times WN + \beta_{10}\, squad \times NN + \beta_{11}\, squad \times NW + \varepsilon \quad (1)$$

where ε is a white noise disturbance term. In this equation, *adjacency* is the seating adjacency matrix, *squad* is the joint squad membership matrix, *WN* is the white-to-non-white matrix, *NN* is the non-white-to-non-white matrix and *NW* is the non-white-to-white matrix. The remaining variables (matrices) are interactions of the academy infrastructure features with the race matrices. The omitted matrix is the white-to-white ties. The p-values reported in Table 5 are obtained from permutation tests using 2000 permutations.

At all time points of the academy, two strong drivers of social knowledge (at T_1 and T_2) and friendship ties (at T_3) are squad membership and seat adjacency ($p < 0.001$). The standardized coefficients for these variables are an order of magnitude larger than for the other terms. Hypotheses 4–6 are supported. The different standardized coefficients suggest that squad membership has more impact than adjacency. It is also a denser matrix. For T_1, relative to the white-to-white ties, the interaction between adjacency and non-white-to-non-white ties implies higher levels of social knowledge among non-white recruits seated together ($p = 0.007$). The interactions of the race matrices and squad membership imply, relative to ties among white recruits, lower levels of social knowledge of white recruits about non-white recruits in the same squad ($p = 0.039$) and lower levels of non-white-to-white ties for recruits in the same squad ($p < 0.001$). For T_2, relative to the white-to-white ties, the only (weakly) significant predictor shows a higher level of white-to-non-white ties between recruits in the same squad ($p = 0.049$). For friendship ties at T_3, *relative to the white-to-white ties*, there are (i) higher levels of friendship between non-white recruits regardless of squad membership and seat adjacency ($p = 0.005$); (ii) higher levels of friendship among non-white recruits who sit next to each other ($p = 0.025$); (iii) higher levels of friendship among non-white recruits belonging to the same squad ($p = 0.001$); (iv) lower friendship levels from non-white-to-white recruits in the same squad ($p < 0.001$). The second of these results suggests that the higher level of ties between non-white recruits in different squads – as seen in the bottom panel of Table 3 – are due to seat adjacency.

The results thus far concern the impacts of squad membership and seat adjacency as two separate variables. Here, we combine these two effects to predict relationship levels. The numbers reported in Table 6 are the fitted values constructed from the QAP regressions reported in Table 5. Note that because the predictor matrices are binary, these fitted values can be expressed as sums of the estimates of the β_j parameters from Eq. (1). In terms of race, we constructed predicted levels of social ties for white-to-white recruit pairs, non-white-to-non-white pairs, white-to-non-white pairs and non-white-to-white pairs. These levels were constructed for four combinations of squad membership (same or different) and seating (adjacent and non-adjacent) to give 16 constructed levels in each panel of Table 6. They reveal one consistent pattern across each row of each panel: (i) the *highest* levels of friendship and social knowledge are for recruits who are in the same squad *and* sit together during lectures and test preparations; (ii) the *lowest* levels of friendship and social knowledge are for recruits in different squads who do not sit together. These two social infrastructure features of the academy operate to generate friendship in predictable and reinforcing ways at the extremes. In the main, levels for pairs of recruits in the same squad but not seated together

are higher than the levels for pairs of recruits in different squads but seated together. Levels of social knowledge at T_2 are fully consistent with this pattern. The one exception for friendship levels at T_3 is for non-white-to-non-white pairs where the level for pairs in different squads and seated together are above the level for pairs the same squads but were not seated together. A similar reversal occurs for social knowledge at T_1 for non-white-to-non-white pairs. In general, these results also suggest that squad membership is a more potent predictor of social tie formation than seat adjacency.

Our empirical results thus far reveal the effectiveness of squad membership and the fixed seating arrangement in generating both social knowledge and friendship within and between races. But, as shown in Table 4, the results are not uniform across the squads: Squads 3 and 4 had no significant differences in friendship levels by race while Squad 1 had lower levels of friendship ties from white-to-non-white recruits and Squad 2 had lower levels of friendship from non-white-to-white recruits. These differences assume particular importance when we consider the late additional session on diversity training. The events that occurred in this session help us interpret this difference between Squads 1 and 2 and show why the difference, in turn, was an important component of the discord that erupted in the late session.

4.2. Diversity training: inclusion & sensitivity

Throughout the academy, staff members claimed that an officer's race is inconsequential for police work. This was expressed in the frequently repeated phrase: "Black and white don't matter anymore, from now on in here you're all blue." If followed, this sentiment suggests an expectation that recruits were subordinating, if not abandoning, memberships in their former groups in order to be part of a new (blue) tribe. The empirical results thus far in this paper suggest that this is an optimistic expectation. The staff worked to degrade recruits to a *shared* sub-status – while presenting themselves as their common enemy – so that the recruits would bond from their opposition to this enemy. Moreover, they offered *all* recruits, regardless of race, an opportunity to achieve the same elevated status of 'police officer'.

Of particular relevance regarding race were two and a half weeks spent, entirely, on cultural diversity. During the non-civilian phase of training, the cohort spent a full week in the department's standard training in cultural sensitivity. The staff scheduled speakers from various groups and organizations representing ethnic and racial minorities, the physically challenged, the elderly, and homosexuals. They gave presentations about local issues in police–minority relations and provided tips on dealing with their respective constituencies as police. These presentations were very pragmatic and organized solely to facilitate smooth interactions between people from differing cultures. Staff members and departmental officials also held seminars on handling police–minority interactions. From our ethnographic observations, with the socialization process still in the initial phase, many recruits *were* resistant to this part of the curriculum. Their continued discomfort within the new environment prevented their opposition from developing into anything beyond minor grumbling. The second diversity session was very different for the recruits.

Prior to this academy training, a series of well publicized police–minority conflicts led city government to schedule this additional round of "cultural inclusion" at the end of training. Held over a 7-day period just *after* the cohort had successfully completed the state certification exam meant recruits, fully in the anticipatory police phase, were the least tolerant of this kind of training. This event, while unexpected, was useful for us to examine the extent to which these new blue tribe members were truly 'blue'. The timing created an entirely different atmosphere compared to the first cultural diversity session. The recruits were, in their own minds, "real" police. Some openly stated that this additional training was worthless.

Moreover, this supplemental training in "how to be nice to people"[4] was cast as "the Mayor's baby" by the training staff. The city in question, like many major metropolitan areas in the United States, had a high degree of racial tension and informal segregation manifest in a near constant tension between the police department and the African American community. Central to this controversy was an African American mayor whom the police regarded as an adversary. Police union officials frequently spoke of being "at war with city hall". Recruits were constantly warned that "the mayor's office would be more than happy to crucify anyone in the department given the opportunity". Both the department and this trained cohort thought every action taken in the fulfillment of their sworn duties would be scrutinized and potentially held against them. Also, the mayor was seen, even by many of his supporters, as a relentless micromanager. Imposing this kind of training upon the department fed into that image. A hostile mayor forcing the additional training upon the recruits did not lead the group to be open to the added curriculum. While the training was included in response to the city's demand, labeling it 'the mayor's baby' also undermined both the credibility and legitimacy of this training segment.

Making matters worse, the training was held in a large lecture hall at a local community college far removed from the police academy. The recruits noticed the room was much nicer than what they were used to in the academy. This reinforced the sense that they were not *really* in the academy. Not only was the environment civilian in nature, so was the appearance of the recruits. For such 'outside' segments of training, recruits were expected to trade their unadorned uniforms for something vaguely defined as 'business casual'. This relief from the rigid structure of the academy seemed to embolden the cohort.

The 68 graduating recruits, now certified by the state as law enforcement officers, were confronted by two academics in a civilian environment. This was a dramatic shift in status for the recruits. They instantly moved from being non-civilian in a police setting to being anticipatory police in a civilian setting. The commanding officer at the academy had been noting frequently that, after 18 or 19 weeks of training, the recruits were moving beyond her control. As she phrased it just before the second diversity training session, "These people have to go [graduate and leave the academy] because from here on out there's nothing I can do with them anymore."

While the civilian instructors had some experience with the local police department in their own city, to the recruits they were just two people with no idea what it meant to be a cop. The new diversity trainers lacked that combination of authority and credibility of the *real* instructors. Moreover, the civilian instructors from the earlier training had all been local and understood the idiosyncrasies of their city and its police while the diversity institute did not. As a further complication, none of the outside instructors in the first wave of diversity training were responsible for presiding over the group for much more than an hour and never without the entire academy staff just steps away. This is in sharp contrast to the diversity institute that was charged with coordinating 7 days of training: in this expanded time frame there was much more room for familiarity and disobedience. The new civilian trainers were cast as outsiders on multiple levels. The recruits thought they were elevated above civilians who had no status relative to

[4] The term 'people' explicitly applied to gays, women and minorities.

police. Some recruits exhibited a level of disrespect and outright contempt that was unparalleled to anything seen previously in this cohort.

At first, the outside instructors were the targets of these hostilities. However, this led to moments when the group turned against itself. The conflict began in a session devoted to gender issues when a few male recruits stated that women should not be police officers. This was the first time in 20 weeks that anyone had openly made such a claim in a formal setting. A line was drawn and some recruits began to stand opposed to others on the issues of *both* race and gender. During one session, the class was presented with hypothetical scenarios, based on actual events that had occurred locally, and asked how they might deal with them. Prior to this, in the anticipatory police phase, a group of minority recruits referred to certain of their white classmates as "thirsty". For them, "thirsty" recruits were "dying for action" and could not wait to "hit the streets and start busting people." Whenever one of the "thirsty" recruits would confirm this label with classroom comments, minority recruits would look at each other and rub their throats to signify thirst. Eventually, the so called "thirsty clique" picked up on this and began taking every opportunity to publicly ask each other if they "wanted a drink or something" in order to generate the reply, "Yeah, you know me, I'm always *thirsty*!" Eventually, when a white recruit responded to a scenario with what was taken as an overly aggressive solution directed towards a young African American suspect, a minority recruit exploded with "Y'all thirsty! All a y'all thirsty!" He reacted strongly to his perception of the cohort's collective mentality. Whether accurate or not, it exemplified a racial tension that was more or less present, but not expressed, throughout the earlier training. We can tie this incident to our earlier network results. The minority recruit who voiced his objection was a prominent member of Squad 2 where the level of non-white-to-white ties was significantly lower. Further, the core of the white 'thirsty clique' all belonged to Squad 1.

Recruits supportive of the "thirsty" responses during the second diversity training expressed themselves in other ways. The instructors attempted to ensure participation by awarding of "diversity dollars". Each recruit was issued a number of these tokens and instructed to give them to colleagues who contributed to class discussions in ways that they found valuable. Eventually, prizes would be awarded to the top earners. During the training, a white Squad 1 member, allied with the 'thirsty clique', was extremely outspoken in voicing 'politically incorrect' opinions regarding diversity training and its value. To the utter dismay of the instructors, he ended up with four times the total diversity dollars of anyone else in the class. This result, along with the examples presented above, revealed significant underlying racial divisions within the cohort involving mostly members of the two squads distinguished by the levels of network ties.

5. Conclusion

Even though our primary interest was network evolution among the recruits, matters of race and inclusion were an integral part of the training regime in the academy we studied. Squads were used as a focus for training and worked to increase levels of social knowledge within and between races through time as well as the level of friendship at the end of the academy. The fixed seating arrangement worked in the same fashion but as a weaker force. Social knowledge and friendship were highest for pairs of recruits in the same squad and were adjacent in the fixed seating—both within and between races. This is in marked contrast to the levels for pairs of recruits that both belonged to the different squads and were separated in the seating arrangement. Pairs of recruits in the same squad only and pairs that were adjacent only were between these extremes with squad membership the more potent predictor (except for ties among non-white recruits). Overall, relative to these social infrastructural variables, race is not a strong predictor of general social knowledge or friendship. Yet, the patterns of the levels of these relations with regard to race, given the academy infrastructure, *are highly salient* and have a coherent structure: controlling for the effects of the social infrastructure, overall mean levels are higher within races than between them. These results were established using quantitative social network analytic methods. While they do point to clear – but limited – successes in promoting social knowledge, understanding and friendship between recruits of different races, they do not tell the whole story. This was emphasized during second diversity training session at the end of the academy. Because this extra session occurred in a 'civilian' location and was associated with a mayor who was not popular in the police department, academic staff of an 'outside' diversity institute became targets of aggressive and hostile responses by many recruits. The late explosion and conflict between some recruits about policing revealed severe limits to socializing them with regard to race and inclusion. The qualitative information about the protagonists – both white and non-white – dovetails nicely with the quantitative evidence when the main protagonists came from the two squads where the race differences within them reflected less success on the part of the academy with regard to social ties and race. The underlying tensions with regard to race (and gender) that erupted during the extra training session suggest, in retrospect, a tactical mistake on the part of the academy. Yet, it is reasonable to assume that the underlying perceptions and antagonisms were present before the extra training session. This additional and imposed session became a stimulus for expressing deep conflicts rather than the minor grumbling that has been a part of the ethnographic record.

As a part of the infrastructure of the academy, squads were formed to mix recruits of different racial categories to increase social knowledge with regard to race and to promote positive relations across racial and gender boundaries. Our results make it clear that it is possible to engineer higher levels of social knowledge and friendship between recruits of different races, especially within squads as intense working environments. Using squads to do this had some success in achieving this goal. A fixed seating arrangement had a lesser impact.[5] However, expunging underlying attitudes regarding race is another matter. Throughout the academy, an underlying tension regarding race existed and was expressed with racist remarks (recorded as part of the ethnographic data). The late additional session on diversity training became a venue where this was expressed strongly and publicly.

These findings fit within established results of the extant literature showing race is a matter of some nuance within police culture. They suggest that the potential of the academy as a locus of organizational change with regard to race has not been realized. While recruits can be socialized into the role of a police officer and race differences can be addressed, deeply held attitudes and beliefs are not dispelled easily. To expect that they could over a mere 21 weeks of training – where the primary emphasis is on creating knowledge of how to be a police officer – seems too optimistic. This reveals some limitations of social network engineering to change deeply held beliefs. The most that could be expected is that increased social knowledge of recruits of other races helps police officers enforce the law without regard to race.

There are some substantive implications stemming from our results. Blanket statements about the 'effects of race' in terms of both homophily and distinctiveness theory merit some qualifica-

[5] Another police academy that we have studied randomly changed the seat assignment every week to "avoid the formation of cliques". This seems a more sensible arrangement if one goal is to enhance the formation of contacts between recruits.

tion given the differences between the squads that we observed. Whatever forces were in play to promote relations between recruits of different racial categories, there were far less effective for Squads 1 and 2 compared to Squads 3 and 4. The notion of networks among whites (as Anglos) being more homogenous receives support in these squads but they also show greater homogeneity for non-whites, in Squads 1 and 2. Further, the level of ties among the non-whites of Squad 1 towards Squad 2 is important and is higher than for the ties between non-whites and whites in the same squad. And the minority members of Squad 2 were all black. It is clear that the detailed composition with regard to race matters and merits further attention.

As a practical matter for police academies, an important policy objective is to recruit more minority group members (and women) into a recruit cohort. The task of creating intense work groups with an effective mix of recruits from different racial categories becomes much easier when there is a greater representation of the different categories in the cohort. Although this particular academy could have done better in constructing racially balanced squads, the task was made much more difficult by the modest representation of some minorities in the cohort.

There are implications also for social network analysis. First, places where networks are studied are more than research sites. Features having particular salience cannot be ignored. It would have been a major mistake to have ignored the academy's infrastructure as a force driving network creation among recruits. Second, features having an impact on network generation need not do so in the same fashion through time. The impact of seating waned over time and the impact of squad membership was greatest when instruction took place primarily in them. Third, objectives of the organization where research is conducted limit the generalizability of the results. Much of the work on organizations building effective teams composed of different people (Mehra et al., 1998, Reagans et al., 2004), while very interesting, is not directly relevant because the academy goal was to eliminate race in favor of creating a blue tribe. This suggests that managing persistent diversity, despite trying to overcome it, could benefit from attention to the kinds of issues raised by Mehra et al. (1998) and Reagans et al. (2004). Fourth, unanticipated events shed light on underlying processes and are usefully studied using both qualitative and quantitative methods. Finally, size and composition of groups matter (Reagans et al., 2004). It would have been nice if the academy had succeeded in having the squads mirror exactly the race distribution of the recruits. It did not and interpreting our results became much more complicated.

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