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Network Integration within a Prison-Based Therapeutic Community

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Abstract

Prison-based therapeutic communities (TCs) are a widespread, effective way to help incarcerated individuals address substance abuse problems. The TC philosophy is grounded in an explicitly relational paradigm that entails building community and conditioning residents to increasingly take responsibility for leadership therein.

Although TCs are based on cultivating a network that continuously integrates new residents, many common structural features can jeopardize TC goals and are hence discouraged (e.g., clustering, homophily). In light of this tension, analyzing the TC from a network perspective can offer new insights to its functioning, as well as to broader questions surrounding how networks integrate new members. In this study we examine a men's TC unit in a Pennsylvania prison over a 10-month span. Using data on residents' informal networks, we examine: (1) how well individuals integrate into the TC network across time, (2) what predicts how well residents integrate into the TC, and (3) how well the TC network structure adheres to theoretical ideals. Results suggest that individual integration is driven by a range of hypothesized factors and, with limited exceptions, the observed TC is able to foster a network structure and integrate residents consistent with TC principles. We discuss the implications of these results for evaluating TCs and for understanding the process of network integration.

Keywords

Network autocorrelation model; substance abuse; network integration; prison; therapeutic community

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¹Belenko and Peugh (2005) estimate that only 1 in 5 incarcerated individuals needing substance abuse treatment received any type of treatment while incarcerated.

1. INTRODUCTION

Mass incarceration and the “War on Drugs” has dramatically increased the number of U.S. prisoners with a substance use diagnosis, with estimates suggesting upwards of 50% of prisoners meet the clinical diagnosis for drug dependence or abuse, compared to approximately 5% of the general population (Bronson et al. 2017; Mumola and Karberg 2006). Yet, very few incarcerated individuals are offered programs or treatment addressing these critical substance abuse/dependency issues (Belenko and Peugh 2005).¹ As a result, large numbers of men and women released from prison each year continue to struggle with substance dependence, significantly limiting their ability to reintegrate into society and resulting in very high recidivism rates. Recognizing the extent and consequences of untreated substance abuse among prisoners, criminal justice policymakers have begun advocating for evidence-based prison drug treatment programs as essential for reducing recidivism rates, and ultimately shrinking the prison population (NIDA 2015; Steyee 2014). The Therapeutic Community (TC) approach is a promising evidence-based substance abuse treatment program increasingly used both within and outside prisons to address widespread substance abuse and addiction issues (Taxman, Perdoni and Harrison 2007).

TCs are residential treatment programs housed within prison units and designed to provide an immersive, highly structured, pro-social environment for the treatment of substance abuse and addiction (De Leon 2000). The TC approach differs from other treatment models in its overarching emphasis on “community” as both the context *and* the method. By emphasizing their interdependence and responsibility to one another, the TC pushes residents to open themselves up to meaningful, positive social relationships that allow them to experience identity shifts congruent with redemption and desistance (De Leon 2000; Stevens 2013). These transformative processes are guided by social learning principles and depend on new residents forming relationships with more experienced members who provide mentoring, monitoring, and corrections that facilitate integration into the TC community (De Leon 2000). In practice, changes in peer relations should accompany the TC treatment process with residents moving from untrustworthy, uninvolved, isolated individuals entering the program to trusting and respected community members fully engaged with the TC and mentoring other program residents (De Leon 2000; Welsh 2007).

TCs administered with high fidelity are effective treatment programs for individuals with substance use disorders, especially for those with serious social and psychological problems (see De Leon et al. 2015 for a general overview). Several meta-analyses find significant associations between prison TC completion and positive outcomes, including long-term criminal desistance and reductions in drug use (Drake 2012; Mitchell, Wilson and MacKenzie 2012; Vanderplasschen et al. 2013) though other studies find no difference between TCs and other forms of treatment (Welsh, Zajac and Bucklen 2014). A closer look at processes within the TC may shed light on such differences by understanding when TCs are more effective. One good candidate is the *peer-network* mechanisms underlying the TC

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modality, which remain virtually untested (De Leon 2000; NIDA 2015; Mitchell et al. 2012). This is not unusual as evaluations of group-based interventions have in general been slow to adopt methods to measure group structure and dynamics (Elreda et al. 2016). A handful of studies have investigated programmatic interactions among prison TC residents using network insights (Doogan and Warren 2017a, 2017b; Warren et al. 2013, 2020) and linked them to TC graduation (Campbell et al. 2018), but only two have also examined the informal structure of TC residents (Kreager et al. 2018a, 2019). Of note, Kreager and colleagues (2018a) found support for several network-based hypotheses regarding integration and community structure in a small TC using cross-sectional data.

The goal of the current study is to evaluate the informal community structure in a prison TC. Network methods offer a powerful means to uncover informal social structures within prisons and other settings (Kreager et al. 2016). The network approach explicitly recognizes and measures the relationships among residents that are essential components of the TC model. By operationalizing key TC principles, we can determine whether vital relational processes are, in fact, present. Longitudinal network data collected for this study allow us to examine theoretical mechanisms related to the overall network structure, participant integration, relationship dynamics, peer role-modeling, and group cohesion. We address three questions: (1) how well do residents adjust to the TC by becoming increasingly integrated, eventually taking leadership roles and mentoring younger residents, (2) what predicts individual integration into the TC, and (3) how well does the overall TC network structure correspond to the ideal of a single, integrated community? Our study offers new insight into the structure and functioning of a relatively unique social network context and serves as a guide for thinking about the network processes underlying interventions in high-risk populations.

2. BACKGROUND

The “community as method” model of the TC is contingent on social interaction and social influence. Mutual self-help, or maintaining one’s recovery through responsible concern for the recovery of others, is a core therapeutic concept and necessitates intensive peer interaction to kindle cognitive and behavioral change. The physical layout and therapy modality of TCs are purposely designed to increase residents’ experience of community within the unit (De Leon 2000). The isolation of the TC unit from the rest of the prison and an intensive group treatment schedule should both produce high levels of interaction between TC residents and foster honesty and self-disclosure during group discussions. Although residents regularly interact with staff, it is peers who become the primary change agents (Doogan and Warren 2017a). TCs are oriented around residents’ relationships with one another, such that change occurs through the establishment of mutually trusting relationships, peer-to-peer modeling, mentoring, and learning.

Several guiding principles serve to create this peer-to-peer community of support and mutual self-aid—*trust, responsibility, empowerment, support, and confrontation*—and together encourage agency and identity shifts congruent with redemption and desistance (Cullen 1994; De Leon 2000). Although this philosophy is inherently relational and grounded in peer-to-peer relationships, the peer-driven mechanisms themselves have received scant

attention (De Leon 2000; Mitchell et al. 2012). The network mechanisms underlying the TC modality are easily extracted from TC philosophy, allowing us to operationalize TC design concepts using network measures and generate testable hypotheses about individual integration into the community and overall TC network structure (Kreager et al. 2018a).

2.1 TC Philosophy and Structure

TCs rely upon peer relationships to reinforce the norms and values of the TC in order to create a community that reinforces positive behavioral patterns (De Leon 2000). Residents influence one another through their participation in a variety of functional and social roles. As new residents assimilate, they must learn to trust and care for other residents on the unit.² In contrast to norms promoted outside of the TC unit, friendships in the TC context are integral aspects of the community and offer residents a chance to positively interact with, support, and care for others. Thus, new residents must develop friendships, trust, and respect in order to adjust and participate in the recovery process.

One means through which TCs enact the community method is a system of formal sanctions. Through these sanctions, known as “affirmations and corrections” or “push-ups and pull-ups,” TC residents provide public feedback to their peers regarding their behavior and progress toward meeting TC goals. Prior studies have used network methods and insights to investigate how well patterns of these interactions conform to TC ideals. In studying several Ohio TCs, Warren et al. (2013) found that residents who received more affirmations also sent more affirmations, suggesting the presence of reciprocity in some form. Further investigations clarified the existence of direct and generalized reciprocity (Doogan and Warren 2017a) and triad closure (Warren et al. 2020) – patterns that should enhance residents’ sense of community. However, these studies also found evidence of homophily on race, age, and TC tenure, which run counter to TC ideals. Doogan and Warren (2017b) report similar patterns for sending corrections, though only homophily on TC tenure. Studies such as these help to demonstrate the value of the network approach, but only begin to scratch the surface. In particular, they focus only on formal TC interactions, which are just one aspect of resident interactions and may not be representative of informal structure more broadly. Much less is known about friendship networks in TCs, though evidence from a pilot study suggests the structure may be quite different from affirmation and correction networks (Kreager et al. 2018a).

Several additional TC programmatic elements also help to promote integration and program engagement. TCs incorporate three formal roles that are hierarchically structured to coincide with movement through TC stages (De Leon 2000). These include peers as “community managers,” “big brothers,” and “role models.” All residents are expected to serve as “community managers” by monitoring, providing feedback, and sharing information with one another in order to promote the norms, values, and expectations of TC culture. In the role of “big brother,” residents are socialized to view the community as a family and learn how to express concern and care for one another. These sibling roles not only inculcate new residents (“little brothers”) into the philosophy of the TC, but also serve as a mechanism to

²These skills are much less useful and possibly dangerous if used by men in the wider prison.

generate attachment, trust, and mutual respect among residents. The last functional and organizational TC role is described and labeled the “role model.” While it is expected that all residents act like role models for one another, the title “role model” is reserved for select residents who most visibly display the behavior, attitudes, and expectations of the community and actively encourage others to do the same. By modeling the expected behavior and attitudes, peer role models show others how to change. Generally, this status is reserved for residents who have spent more time within the TC and have advanced through the program. It is important for TCs to have multiple role models to minimize the possibility of one charismatic leader having undue influence on others.

TCs are organized around movement through a sequence of hierarchically structured phases of recovery and treatment. As senior residents complete the program and graduate, new residents enter, generating a network that is continuously in flux. The TC we studied has a three-phase structure.³ Phase 1 (induction) occurs when participants enter the TC, receive a clinical diagnosis, and are introduced to the objectives, structure, and rules guiding TC treatment. Here it is expected that residents will deepen their understanding of and investment in the TC. A critical goal during this stage is assimilation, with residents expected to begin embedding themselves in the community (De Leon 2000). Aiding the new resident with this transition is their “big brother,” a more senior resident who is formally assigned to guide and mentor an incoming resident. As they begin to become more engaged, responsible, and supportive of the community norms and principles, they transition to the second phase of the program.

Phase 2 (primary treatment) requires that participants assume additional responsibility, increase their involvement in TC activities, support day-to-day unit operations, and shift into a mentoring role. During this intense treatment phase, residents are encouraged to actively monitor and assess other members’ behaviors and attitudes (“community manager role”), participate in group and individual therapy, and learn behavior management techniques. Through this period, treatment engagement should increase substantially as residents develop relationships (to both more senior and newer residents) and adopt formal roles as “big brothers” or “role models.” The goals of primary treatment are achieved when a resident becomes a recognized “role model” who provides leadership in the program (e.g., by organizing community meetings, selecting readings for the day’s recovery theme, correcting others’ behavior, and participating in group discussions). By this point, residents should be thoroughly integrated into the community.

During Phase 3 (re-entry), residents work with treatment specialists to create individual relapse prevention plans. As residents enter this last phase and begin planning their exit from the program and possible prison release, their focus should turn inward as they attend to the specific details of their treatment plan and building positive recovery-oriented social ties outside of the isolated TC environment. Phase 3 residents are expected to transition out of their leadership roles, passing the baton on to earlier Phase residents. Structurally, this phase should correspond with relative stability in established peer relationships but less engagement with new inductees.

³TCs differ in the exact nature of phases.

2.2 TC Integration

Based on the preceding discussion, we expect successful TC integration to reveal itself across several dimensions. These include socially through relationships with other residents (*structural*), adoption of key roles in the TC, such as a big brother or community role model (*roles*), and feeling increased community connection and acceptance (*belonging*). These dimensions are distinct in that residents can integrate in some ways, but not others. Most likely, this would be by developing social relationships without fulfilling leadership responsibilities.

Structurally, we expect that new residents initially enter the TC with few friendship ties and possible skepticism toward other community members. As they progress through the various phases of the TC, this should change dramatically with friendships, trust, and respect continuing to increase as the resident becomes more engaged and committed to the program.⁴ Thus, relationship quantity and quality should increase across one's TC tenure (Kreager et al. 2018a).

In addition to building informal social ties, residents who are invested in the program should adopt mentorship or leadership roles. Genuine mentorship is a selfless act, an uncommon occurrence in the Machiavellian atmosphere of men's prisons. Being a devoted big brother demonstrates a willingness to defy the natural order of prison and invest in the recovery process, as well as being vulnerable to others and open to the challenges of self-discovery and behavioral change. Adoption of leadership roles in the TC signals similar devotion to the TC process of recovery; TC leaders must be willing to correct and affirm the behavior of individual residents and the community as a whole, actions that can be labeled as "snitching" in the prison environment. Leadership in the TC thus requires a suite of behaviors that are more generally suppressed within the broader culture of men's prisons.

As individuals socially acclimate and adopt a leadership role, they should develop a subjective sense of belonging to the community. De Leon (2000) stresses the importance of TC residents feeling "psychologically safe" within the community, given the reliance of the model on honesty, self-disclosure, and peer-driven corrections and affirmations of behavior. The trust and vulnerability required by these processes rest on residents feeling safe, accepted, and valued within the TC community. As residents progress through the program and adopt leadership roles, their increasing commitment to the community should result in stronger social belongingness.

In this context, we expect all residents to become socially integrated to a certain extent, for instance, by forming ties to fellow residents. Thus, the question we ask is who becomes *more* integrated. Are there systematic processes at work that help some residents to more fully integrate into the TC than others? To address this question, we explore three classes of explanation: treatment-related factors, relationships with exemplars, and unit composition. First, some individuals may have a greater need for treatment, or otherwise be more willing to "buy-in" to the TC. Previous research has demonstrated that levels of treatment readiness,

⁴TC friendships can have positive and negative consequences for treatment success (De Leon 2000), though this is not something we address in the current study.

motivation, desire for help, and problem recognition affect treatment engagement both at intake and throughout the duration of prison-based TC treatment (Welsh and McGrain 2008; Rosen et al. 2004; Hiller et al. 2002). However, evidence regarding the impact of pre-treatment severity of substance use on treatment outcomes is mixed (Patkar et al. 2002; Simpson et al. 1999).

Second, integration may be facilitated by other TC residents. Research focused on “newcomer socialization” identifies several processes that facilitate adjustment to a new environment (Morrison 2002). Chief among these are social network ties that can provide needed resources such as information, guidance, norms, and support (Bauer et al. 2007). New residents may already know some residents prior to entering the TC, and once admitted they are assigned a cellmate and big brother. Such contacts are likely among the first residents to whom newcomers turn to ease their transition, and thus occupy an important position where they can sway newcomer’s views of the TC. In the ideal case they offer legitimacy to the TC, knowledge of TC operations, strategies to succeed, norm clarification, and serve as a positive role model. Thus, we would expect new residents to more fully assimilate if they have ties to someone who himself is well-integrated (e.g., exemplars, such as a formal role model). Such individuals’ positive views of the TC are likely to influence newcomers (i.e., through structural balance). Moreover, ties to well-integrated residents offer a means for newcomers to meet other unit residents with positive TC orientations (i.e., through transitivity). This hypothesis is consistent with previous findings that TC graduation is increased when residents receive affirmations from other residents who ultimately graduate (Campbell et al. 2018).

Third, given the community as method approach, there is high potential for social influence in the TC. The direction of that influence on new residents (i.e., community-wide increase or decrease in investment in the program) is likely to depend on the composition of the unit upon entry. For instance, the overall opinion toward the TC may be one of openness and buy-in or more of a cynical, “do your time” perspective. Positive initial impressions of the TC community process are associated with persistence in treatment (Mandell et al. 2008). To the extent current residents are engaged in the program, we would expect that new members will be more likely to attempt to integrate.

2.3 Unit-Level Network Structure

Individual integration is only one ingredient for a successful TC. Unit fidelity to TC philosophy also impacts the ability of individual residents to undergo successful identity transformation. To be effective, a TC should exhibit several distinctive network features (Kreager et al. 2018a). First, integration into the community requires that everyone in the TC be connected to other TC residents, with more ties representing greater integration. This *interconnectedness* translates to a highly dense social structure. Similarly, the need for integration and adoption of a community mindset necessitates helping residents develop close, trusting peer relationships, resulting in networks characterized by a high degree of *mutuality* (whereby both members of dyads reciprocate perceptions of their relationship). Although TCs are democratic, their reliance on senior residents to mentor and guide newer residents across phases means that some degree of *hierarchy* is necessary. Accordingly,

respected senior residents should be found occupying more central positions (Kreager et al. 2017).

Other aspects of the model TC structure may be more difficult to achieve, given they violate natural connection strategies people use when joining a new setting. For instance, ties often form via mutual friends (i.e., transitivity) and between relatively similar people (i.e., homophily; McPherson et al., 2001). Either of these can lead to clustering and subgroups (i.e., ties are more concentrated within than between groups), which, although natural, inhibit the diffusion of information and expectations, and may allow local norms to develop that conflict with TC goals. Clique formation is especially dangerous in TCs because they threaten the community orientation and “resonate the negative influences of peers in the history of most residents” (De Leon 2000: 174). In Lau and Murnighan’s (1998) terms, the TC must fight against the natural “group fault lines” that may form around shared attributes of TC members and instead promote cross-group connections. Thus, TCs are explicitly designed to prevent group solidification, clique formation, and the prioritization of group goals above those of the community. This means that subgroups based on other shared attributes, such as race, background, or criminal histories that may impede or jeopardize the overall functioning of the community are discouraged (Kreager et al. 2018a). Consequently, the TC network should be low in homophily and constitute a *single component* in which everyone is directly or indirectly connected to everyone else (De Leon 2000).

Summarizing the above, we expect the high-fidelity prison TC to exhibit minimal evidence of subgroup clustering and no isolated residents. More senior residents with ties to both newer residents and senior peers should have more ties, with newer residents having fewer and weaker ties. The few ties that newer residents have should be with senior mentors, especially big brothers or role models. Late-stage residents would also be loosely tied to the network, primarily through relationships with the core members who they mentored.

3. DATA & METHOD

This project is part of the Therapeutic Community Prison Inmate Network Study (TC-PINS), approved by the Penn State IRB. Data were collected from August 2016 to May 2017 at a medium-security men’s Pennsylvania state prison. This urban-based facility has a heightened focus on substance use treatment, aiming to provide treatment to over 1,000 men each year, primarily through the TC model. Given this orientation, the prison houses many short-sentence men with drug-related offenses while they complete substance abuse programming near the end of their sentences. We focus on one of the five TC units the prison operates.

During intake to the state prison system in Pennsylvania, individuals are administered the TCU Drug Screen II (TCU Institute of Behavioral Research, 2014). TCU scores range from zero to nine and indicate the severity of substance use disorder. In the Pennsylvania system, those scoring a six or above are mandated to complete the TC program to be eligible for parole.⁵ Those who decline to participate by “signing out” of the program agree to serve their maximum sentence, as opposed to being parole eligible at their minimum sentence date. Consequently, individuals who are not interested in treatment may be placed in the TC

alongside residents who are more invested in their recovery and the program. Given the TC's community method, such coercion into treatment may impact the recovery environment and peer influence processes.

The unit we studied has 62 available beds, with residents residing in two-person cells. TC units at this prison are organized with two-tier cells in a U-shape that opens to a large group space where meetings and treatment groups are held. The units are also equipped with three counselor offices and a closed-door group room. Each TC unit is enclosed and isolated from the remainder of the prison, with residents spending the majority of their day locked in their unit. TC residents can only interact with individuals outside of their TC unit at meals, yard, and religious services. TC residents may be enrolled in GED classes or have other treatment groups (e.g., Violence Prevention), but do not hold jobs during their months of TC residency.⁶

Residents live in the TC unit for an average of four months (shorter than the ideal TC [De Leon 2000]), with some staying a few weeks longer based upon bed availability in other prison blocks. During those four months, they are expected to participate in a daily schedule of TC meetings and groups from Monday to Friday. Each day begins and ends with a full community meeting, with the hours in between filled with treatment groups. These groups are either full community groups (i.e., all 62 TC residents) or split based on phase due to the different treatment orientation of each.

3.1 Data Collection Design

TC-PINS data were collected monthly for ten consecutive months. All current unit residents were targeted for data collection in each month. Recruitment took place through a formal announcement during the morning group meeting and via follow-up conversations with individual residents. The research team provided information on study aims, gave a brief overview of the content of the survey, emphasized anonymity and confidentiality, and answered any questions. Rolling recruitment took place during the two days of data collection, with the research team continuing to answer questions and provide information about study aims. Given the two-day data collection design, many participants learned about the study via word-of-mouth.

Residents who opted to participate in the research completed a computer-assisted personal interview (CAPI) survey. The CAPI consisted of a variety of open- and closed-ended questions about familial relationships, treatment engagement, future expectations, various peer network measures, and their experiences in and evaluation of the TC program. Relationships can be a sensitive topic within the prison setting (Whichard, Schaefer and Kreager in press); thus, the CAPI was administered one-on-one in a private setting. During the interview, the researcher read all questions and answer choices aloud, providing

⁵The only exception is non-violent drug offenders sentenced to Pennsylvania's State Intermediate Punishment (SIP) program; individuals are eligible for SIP with a TCU score of 3 or above. Completion of a prison-based TC is a requirement of SIP. Two of our respondents had TCU scores below 6 (both with scores of 3).

⁶Residents help with cleaning the block, but most responsibilities for TC maintenance that residents assume in nonprison TCs are handled by staff (e.g., cooking). While not engaged in treatment-oriented activities, residents have free time that resembles their time in general population (e.g., watching television, reading, playing cards).

clarification when necessary. Survey data were supplemented by information from the Pennsylvania Department of Corrections that included intake, offense, and sociodemographic information.

During the 10-month observation span, a total of 210 men resided on the TC during at least one observation wave. Of these, 177 (84%) participated in at least one wave of data collection.⁷ We exclude the 7 survey participants who entered the unit in wave 10 as the remaining observation window was not long enough for them to fully integrate into the unit, giving us a sample size of 170. Across waves, an average of 61.5 men resided on the TC unit (range 60-62), of whom 47.2 participated in the survey on average (range 43-50). Figure 1 presents the frequency of each sequence of participation across waves and helps to convey the revolving nature of unit membership. Observation spells are typically no longer than 4 and occasionally 5 months. More than half of respondents (57%) participated in at least 3 waves of data collection, which would include at least half of their time in Phase 2 when they should be most integrated. Overall, 80% of residents were observed at least once during Phase 2. Averaging across waves, 24% of residents were in Phase 1, 49% in Phase 2, and 27% in Phase 3.

3.2 Measures

Respondents were asked about several kinds of relationships with other unit residents. Incarcerated individuals are often cynical of the notion of “friendships” with incarcerated peers; thus, respondents were asked which TC residents they “get along with most,” which is an indicator of positive affiliation akin to friendship (Schaefer et al. 2017). Respondents were also asked to identify their cellmate, big brother, little brother, community role models (i.e., “Who do other people see as role models in the community?”), and anyone known prior to entering the unit. These items were used to construct 5 of the 6 integration outcomes: (1) The number of other residents the respondent said they got along with (outdegree) represents perceived structural integration. (2) The number of times other residents said they got along with the respondent (indegree) is an objective measure of structural integration. (3) The number of outgoing nominations matched by incoming nominations (mutual ties) represents the development of stronger relationships. For each of these measures we took the maximum value across all waves when a respondent was present as our measure of integration. To measure integration through formal relational program steps we recorded if a respondent was ever named as a (4) big brother or (5) community role model (yes or no). (6) Our final outcome was a social belongingness scale consisting of eight items adapted from the belongingness questions of the Interpersonal Needs Questionnaire (Van Orden et al. 2012; see Appendix A). As shown by the correlations in Table 1, these measures represent distinctive aspects of integration. Importantly, they include both subjective measures (i.e., outdegree, belongingness) and objective, external measures (i.e., big brother, role model, indegree). The highest correlations are between mutual ties and the outdegree and indegree measures (.65 and .62 respectively), which is attributable to a fairly high rate of reciprocity. Remaining correlations are .43 or lower.

⁷We estimate that 5.7% of residents left the unit before completing treatment during our study, but we do not have information on why. This estimate is based on the 156 residents in Phase 1 during Waves 1-8, of whom 9 were not on the unit 2 waves later and never observed in Phase 3. This rate may seem low compared to other TCs, but may be explained by the shorter, 4-month duration.

To predict TC integration, we use two *treatment factors*: (1) Engagement was evaluated with the self-reported Client Assessment Summary (CAS), a validated TC treatment engagement scale (Kressel and De Leon 1997; see Appendix B). We used each participant's baseline measure of engagement as a means to preserve causal order (i.e., that engagement predicts, versus being a consequence of, integration). (2) Need for treatment was based on the TCU score. To evaluate whether *ties to exemplars* facilitated integration, we calculated the maximum indegree in the get-along network and maximum indegree in the Community Role Model network for key relationships (i.e., cellmate, big brother, and anyone known prior who the respondent reported getting along with). If there were multiple partners in a role, we used the maximum across such alters. Each of these were measured based upon relationships reported during each resident's first observation wave. To test how *unit composition* affected integration, we calculated the mean engagement of the other Phase 1 residents in each individual's incoming cohort. Finally, we included controls for age, race, education (TABE), prison tenure (logged days), and knowing someone prior to entry. We created a dummy variable for residents entering in wave 9, who also may not have been observed long enough for us to record their ultimate integration.

3.3 Modeling Approach

To evaluate which residents more fully integrated into the unit we estimated a series of network autocorrelation models (Leenders 2002). These models predicted each resident's integration using individual attributes measured either prior to entry or during their first observation wave, making them exogenous to each resident's integration into the TC. We account for non-independence of residents through a parameter in each model that estimates the correlation of each resident's outcome with the set of other residents who were ever in his get-along network.⁸ For the three outcomes based on number of ties (outdegree, indegree, and mutual ties) we specified a Poisson model. Models for outdegree and indegree revealed overdispersion; thus, we switched to quasi-Poisson models that did not constrain the dispersion parameter to 1. In testing whether residents ever became a big brother or role model (dichotomous outcomes), we specified logit models. We used a Gaussian model for the social belonging outcome. To check the robustness of our results to missing data due to non-response, we estimated additional models using the full TC unit population for indegree, big brother, and role model, which are outcomes available for all residents (N=197 residents entering prior to Wave 10).⁹ For these models we could not include self-reported treatment engagement as a predictor. Results are largely consistent with our primary models (see Appendix C). All models were estimated using R version 3.3.3 and version 1.6.5 of the *tnam* package (Leifeld and Cranmer 2017).

⁸The weight matrix \mathbf{W} was specified as $w_{ij}=1$ if i named j in the get-along network in any of the 10 waves, otherwise $w_{ij}=0$. The weight matrix was row-normalized for estimation.

⁹This approach allows us to include non-respondents as units of observation, but still suffers from measurement error because ties emanating from non-respondents are not counted in these outcome measures. The extent to which estimates of non-respondent integration are biased downward is a function of whether non-respondents would have disproportionately named other non-respondents.

4. RESULTS

4.1 Individual Level Integration

Our first question was how well individuals integrated into the TC over time. According to TC philosophy, residents should become increasingly integrated as they progress through the treatment program, eventually taking leadership roles during Phase 2 and helping to mentor younger residents. Descriptive results presented in Table 1 indicate that 49% of residents eventually became a big brother to another resident. We also found that 57% of residents were nominated as a community role model by at least one other resident.

We begin to assess how integration changed over time by examining how network structure was associated with program phase (recalling that residents progress across 3 distinct phases during their stay). The aforementioned levels of connectedness and mutuality were associated with TC phase in a manner consistent with TC philosophy. Phase 1 residents, who recently entered the unit, named an average of 2.8 residents in the get along with network (of which .8 were mutual). These numbers rise to 4.8 and 5.5 for Phase 2 and 3 residents respectively (1.9 and 2.3 of which were mutual). And, the few participants who were isolated by virtue of having no connections to other residents were predominantly Phase 1 residents (86%). The correlation between phase and outdegree is .27 ($p < .001$) rising to .35 for mutual ties ($p < .001$). In terms of social belonging, we find an increase in the mean across the three phases: $M_1=3.48$ ($sd=.63$), $M_2=3.70$ ($sd=.60$), $M_3=3.72$ ($sd=.56$). Though small in magnitude, the increase from Phase 1 to 2 is significant ($t_{[84]}=4.49$, $p < .001$), while the change from Phase 2 to 3 is not ($t_{[93]}=1.43$, $p=.16$). This is consistent with the biggest increase in integration occurring from Phase 1 to 2 as new residents were socialized. All told, these analyses suggest that more senior TC residents were more embedded in the informal unit structure.

4.2 Predictors of Resident Integration

To understand who integrated more fully into the TC, we present the bivariate correlations between our predictors and measures of integration in Table 3. We tested the net effects of these predictors through a series of linear models in which all effects were estimated jointly (Table 4).

Starting with controls, the network autocorrelation parameter was positive and significant in half the models. This result indicates that residents who were more integrated in terms of the number of ties and big brother status tended to be connected to peers who were similarly integrated. We see no effects of resident race/ethnicity, while the lone significant effect of greater education was on becoming a role model.¹⁰ We find that older men had lower indegree, while residents who had been in prison longer had lower outdegree and fewer mutual ties. This pattern suggests less integration into the TC for older men with longer prison tenures. We find a positive effect of prior acquaintance on indegree ($p < .10$), however in contrast to the bivariate analysis above, we see a negative effect of prior acquaintance

¹⁰Models with the full sample of 197 residents (Appendix C) did reveal a positive effect of Black on ever being named a role model. This effect appeared when we included non-respondents in the analysis because all 7 of the non-respondents who were role models were Black (i.e., 7/14 Black and 0/13 White non-respondents were ever role models).

appearing in the outdegree model (we say more about this below). Lastly, residents who entered the unit during wave 9 had lower integration across most outcomes.

Results for treatment related factors continue to show fairly consistent effects of initial engagement on integration. Coefficients are all positive, with significant effects for outdegree, social belonging, and becoming a big brother. Although we fail to find evidence that TCU score was associated with integration, residents whose engagement score indicates higher initial positive orientation towards the TC were more successfully integrated and more likely to take on leadership roles.

Turning to connections to exemplars, we find that a well-connected cellmate had the most consistently positive effect on integration. Cellmate integration was predictive of indegree and becoming a role model. Having a well-integrated big brother was associated with one's social belonging, and we see a marginally significant effect on becoming a role model. Lastly, a well-integrated prior acquaintance predicted outdegree (and indegree too, when we include non-respondents; see Appendix C). This effect helps to explain the negative effect of prior acquaintance on outdegree reported earlier. Namely, having a prior acquaintance was only beneficial for outdegree if that person was himself well-integrated. By contrast, having a poorly-connected previous acquaintance restricted one's social integration. Overall, these results suggest that others can facilitate new residents' adjustment to the unit, consistent with TC philosophy. However, it is residents' cellmates who had more consistent effects on a range of integration outcomes rather than big brothers and prior acquaintances, whose effects were more limited.

Our last correlate of integration is unit composition. The higher the level of engagement of Phase 1 residents during unit entry, the greater was new residents' ultimate social belonging. Effects in the remaining models are all positive, but only the effect on social belonging approaches statistical significance. Thus, there is limited evidence that the attitudes of one's incoming cohort mattered for resident's ultimate integration to the TC.

4.3 Unit-Level Structure

Our final research question centers on how well the overall TC network structure corresponds to the TC ideal of a single, integrated community. Analysis of the "get along with" network reveals that the vast majority of residents formed relationships. On average, 95.4% of residents on the unit had a tie with at least one other resident during a given wave (Table 5). If we focus only on residents who responded to the survey, we find that 98.5% of residents named at least one person in the get-along network. These numbers are fairly consistent across waves, ranging from 86.9-98.4% for the whole unit, and 95.6-100% for surveyed residents.

On average, residents had 4.5 ties to other residents (1.75 were mutual ties). With one exception (wave 4), this average was fairly consistent across survey waves, ranging from 4.32 to 5.19 (1.56 to 2.12 for mutual ties). On average, 38.8% of nominations were reciprocated by the person being nominated. Figure 2 presents the get-along indegree distributions for the 10 waves. The distributions are skewed right, with more than 90% of indegree counts falling in the 0-10 range. All waves have a minimum indegree of either 0 or

1, and a maximum indegree of at least 11. At the higher levels, an average of 2.4 residents received more than 11 nominations in each wave (with 3 receiving more than 17). Thus, we find that most residents were integrated into the unit, with a handful having indegrees 3-5 times the average of 4.5.

Analyses of the overall network shed light on the extent to which the unit is hierarchical, marked by subgroups (e.g., cliques), or otherwise characterized by groupings based on resident attributes. The unit network was consistently a single component, with no isolated subgroups of residents. Thus, in each wave, all non-isolated residents could reach one another either directly or indirectly. Figure 3 presents two representative depictions of the networks from waves 3 and 8. In the figure, connectedness is evident in that all residents could reach one another either directly or indirectly through other men on the unit. Because residents differed in their connectedness largely based upon phase, Phase 1 residents were more often found on the edges of the network, while Phase 2 and 3 residents were positioned closer to the center. Thus, as expected based on TC philosophy, more senior TC residents were located in the center of the network where they could serve a vital leadership role.

Figure 3 also reveals consistency in network structure over time. Waves 3 and 8 appear quite similar – in the number of ties, the position of residents of different phases, and the amount of mutuality – even though unit membership had completely turned over from wave 3 to 8. Thus, despite the unit experiencing a turnover of 2-3 residents per week, with concomitant changes in relationships among residents, the structure of informal relations among residents remained relatively stable.

Another way to examine the level of overall connectedness is structural cohesion, defined as “the minimum number of individuals whose continued presence is required to retain the group’s connectedness” (Moody and White 2003: 105). This approach identifies the number of nodes (k) who would need to be removed to split the network into multiple components. Structural cohesion is calculated iteratively, beginning with $k=1$ and increasing until the network is disconnected, at which point the maximum k is identified. With maximum k , every pair of nodes can be disconnected by the removal of k other nodes. At the individual level, a node’s *nestedness* has the highest value of k at which they still belong to the largest component, up to maximum k . For example, a node that remains in the component after the removal of any single other node has nestedness=1. A node that remains part of the component after the removal of any two other nodes has nestedness=2. As nestedness increases, individuals are more structurally embedded as they can reach other nodes through more and more routes. Consistent with earlier results, the average correlation between phase and nestedness was .41 across waves (range .07-.63) with 7 of the 10 coefficients significant at $p < .05$ (two other waves had $p < .10$).

We found that across the 10 waves, maximum k ranged from 4-7, meaning that at least 4 nodes, and sometimes more, would need to be removed at each wave to disconnect the network. Figure 4 presents the distribution of the proportion of nodes belonging to the largest component for values of k ranging from 0, where all nodes belong to the largest component, up to each network’s maximum k , by which point each wave’s network has split into multiple components. We see that up to $k=4$, more than 90% of nodes continue to

belong to the largest component. This proportion gradually decreases with higher k , such that by $k=6$ or higher, just under 60% of nodes on average belong to the largest component.

The analysis of structural cohesion also sheds light on whether subgroups in the network exist. This can be seen by whether the network splits into multiple components before maximum k is reached. By contrast, in the absence of subgroups, the remaining component will simply shrink as k increases and nodes fall out of the network. We find that in 9 of the 10 waves, all values of $1-k$ correspond to only one component. In other words, as k increases, the resulting networks still consist of only a single component. The exception is Wave 4, where at $k=3$ the network splits into two components (sized 27 and 4) before becoming a single component, with 13 nodes, at $k=4$. Thus, almost universally the TC network consisted of a single, cohesive network structure across time.

To further evaluate clustering, we measure how several attributes were related to network structure. For each wave, we calculated the level of homophily on notable individual attributes, using Moran's I for continuous attributes and odds ratios for categorical attributes (Figure 5). While some degree of homophily is expected in almost any social setting (McPherson et al., 2001), a well-integrated unit would be expected to display homophily that is rather low in magnitude. The Moran's I measure of network autocorrelation indicates that residents were more likely to have ties to someone similar in education, age, prison tenure, and engagement in most waves. Though predominantly positive, the magnitudes were rather small, with most falling in the range of 0 to .2.¹¹ We find no evidence that residents tended to have ties to others based on similarity in their TCU scores. Homophily on race and phase was observed more consistently. The average odds of nominating someone of the same race were 2.2 times greater than someone of a different race on average, while odds of nominating someone in the same phase were 1.6 times greater than someone in a different phase.

We disaggregate the analysis of phase to gain better insight into how residents were connected across phases of treatment. Table 6 presents the average odds of residents in each phase having a tie to residents in every other phase across waves. Odds ratios greater than 1 on the diagonal indicate that for each phase, residents were likely to get along with peers in the same phase. A tie to someone in the same phase was 1.4 to 2.2 times greater than a tie to someone in a different phase. Nonetheless, some ties extended outside of one's phase. Residents in Phase 1 were also likely to report they got along with residents in Phase 2. And residents in Phases 2 and 3 named each other more often than they named residents in Phase 1.

5. DISCUSSION

Therapeutic communities rely heavily upon relational mechanisms to help residents address their substance use problems. "Community as method" is at the heart of the TC modality (De Leon 2000), yet examinations of TCs and their efficacy have only recently begun to adopt methods to evaluate relational aspects of TC operations (Doogan and Warren 2017a,

¹¹As context, Moran's I has the same range and interpretation as Pearson's r : -1 to 1.

2017b; Kreager et al. 2019). Following Kreager et al. (2018a), we use a social network approach to investigate how several aspects of TC structure align with the principles behind effective TC design. Our results offer insight into the social organization within a TC and its integration of new members.

Our first research question asked how well new residents integrate into the community. We found that most residents developed relationships with other TC residents. In fact, isolation was rare and largely confined to residents who had just entered the unit. This finding is consistent with Kreager et al.'s (2018a) pilot study, though the average of 4.5 ties we observe is lower than the overall mean of 7 they report. We also found that residents established 1.75 mutual ties to other residents. This corresponds to a rate of .39, which is higher than the rate of .30 found in a comparable good behavior unit of another men's prison (Schaefer et al. 2017) suggesting that TC residents may be forming stronger ties than incarcerated men more generally. As expected, embeddedness in the TC network increased across time as new residents assimilated to the TC. Thus, individual level network structure and change is consistent with TC philosophy.

Several patterns stood out in addressing our second research question regarding who integrates more fully into the TC. At the bivariate level, treatment factors, ties to TC exemplars, and cohort engagement were associated with greater integration. When adding controls in the network autocorrelation models, several of these associations dissipated. Nonetheless, we saw fairly consistent effects of baseline engagement, ties to exemplars, and prison tenure. These were all measured at the very early stages of TC residency, indicating it is possible to predict in part how well residents integrate into the TC based on pre-treatment factors. The fact that baseline engagement was predictive suggests that subjective attitudes toward the TC may be critically important (see Davidson and Young 2019). An open question is whether this greater integration leads to more highly engaged residents choosing to associate with one another and provide positive reinforcement of TC messages, as suggested by Campbell and colleagues (2018). We did not find any effects of substance use severity and need for treatment as captured by the TCU score. It is important to note that our sample has low variation in TCU score, with 62% of TC residents scoring a six. While a score of three or greater on the TCU Drug Screen II corresponds with a DSM drug dependency diagnosis (TCU Institute of Behavioral Research 2014), individuals must score at least six to be mandated to TC treatment in Pennsylvania. TCU score may have greater predictive power in a sample with a broader distribution of scores.

The effect of cohort engagement was consistently positive but only predictive of social belonging. This raises the question of whether influence was stronger through direct ties to exemplars versus the more general, group-level attitude of one's cohort. It would be worthwhile to look deeper into the nature of relationships to exemplars and identify what is occurring within these relationships. Exemplars in the form of role models represent "the idealized peer" (De Leon 2000: 171). However, the TC model doesn't discuss why being directly connected to role models or other well-integrated residents (versus their general presence in the TC) might affect TC assimilation. Friendships are an "integral component of community as method," such that "positive bonds with specific individuals can facilitate affiliation with the general community" (De Leon 2000: 188). Determining how these

various community-level and individual-level relationships (e.g., cellmate, friend, big brother, acquaintance, role model) affect integration, engagement, and long-term outcomes is even more complex within the altered recovery environment of the prison-based TC. Network methods designed to measure social capital and more detailed exchanges of resources and support may be particularly useful here.

Our final question was how well the informal TC network resembled the ideal cohesive structure. It is possible for residents to become individually integrated, but if the overall network is fractured, then such integration may not be beneficial and risks reinforcing anti-TC sentiments. Our results suggest this is not the case—across months, the unit consistently resembled a single cohesive entity. Moreover, advanced residents were more deeply embedded in the network, occupying more central network positions. This is important in light of the continuously rotating membership and suggests the TC was resilient to leadership and composition changes as intended through its design.

Other patterns offer mixed impressions. Participants tended to have ties to fellow residents in their same phase, though Phase 2 and 3 residents were also tied at above chance rates. This pattern is consistent with the TC design, which promotes ties to residents in the same phase, via phase-based therapy groups, and ties outside one's phase through formal mentorship. Phase 3 residents are also expected to begin withdrawing from the community as they focus on their re-entry and long-term recovery, further explaining the lack of ties between Phase 1 and Phase 3 residents. In contrast to reports of racialized experiences within prison-based TCs (Kerrison 2018), we observed almost no racial/ethnic differences in integration, consistent with prior research on affirmation patterns (Linley, Warren and Davis 2010). The lone effect was that our robustness test found that Black residents were more likely to have ever been named a role model. Outside of this effect, the TC did not appear to “favor” the integration of one race over another. Nonetheless, we found homophily on several sociodemographic attributes, including age, race, and program tenure. These patterns are consistent with Doogan and Warren (2017a) who found that residents were more likely to affirm peers (i.e., send positive messages during group sessions) who shared these similarities. However, the levels we observed are lower than Schaefer et al.'s (2017) study of non-TC prisoners for those attributes measured in common: Moran's I statistics for age and prison tenure were half as large, and the odds ratio representing race homophily was 2.2, compared to 3.5. Thus, homophily in the TC was not as extreme as observed in a similar prison context. Given the forces known to promote homophily (McPherson et al. 2001), this is notable. Indeed, it may be unrealistic to expect TC programming to reduce homophily to chance levels. In sum, these patterns suggest that by and large residents became integrated into a single community, though one characterized by small levels of segregation.

Some of our findings highlight the challenges and considerations inherent when the TC method is implemented within a prison setting. While the TC model emphasizes the roles of “big brother” and “role model,” we find that cellmates and prior acquaintances can also affect integration. In a related study, we found that these relations are more predictive of a relationship than formal big/little brother roles (Schaefer and Kreager, in press). The influence of cellmates on eventual integration is unsurprising given the sheer amount of time cellmates spend together. Cellmates are often assumed to be negative influences, responsible

for the transmission of criminal capital. However, recent research finds that being housed with a more criminally experienced cellmate results in null or even deterrent effects on post-release recidivism (Harris, Nakamura, and Bucklen 2018). Our results suggest that cellmates could even be a positive influence in the right circumstances. This is important to consider further in refining the prison-based TC modality, especially since the TC's emphasis on trust and developing positive peer interactions could lead to stronger cellmate influence than in the general prison population. We also found an effect of prior acquaintances on integration, which is reasonable given the sharp disconnect between TC culture and the normative prison environment. Having a prior acquaintance in the TC may have provided a safety net of sorts for new residents as they attempted to navigate and balance the opposing influences of typical prison culture and TC culture. While highly engaged and well-integrated cellmates and prior acquaintances work in tandem to reinforce the TC message and goals, these influences can be detrimental if they are not engaged and integrated.

Big brothers and role models are intended to be primary sources of influence, but other relationships are important and could blunt their effectiveness. Cellmates and prior acquaintances are not addressed by the original TC model, which was developed outside the prison setting, but such relationships are inevitable in current prison environments. These informal relationships present an interesting dilemma. While they may contribute to network patterns that are detrimental to the TC model, such as homophily and subgroups, these informal relationships could also be protective and may be more genuine and sustainable within an incarcerated population. The vulnerability required during recovery might emerge more rapidly and successfully in these more intense dyadic relationships, which is crucial given the shortened duration of these prison-based programs. By highlighting these relationships, our findings point to a possible avenue where TCs could innovate. At a minimum, we encourage additional investigation of the roles that cellmates and prior acquaintances play in resident assimilation and exploration of how actively managing such roles could be leveraged to improve TC functioning.

We offer the first network-based evaluation of TC informal structure. In interpreting our results, it must be kept in mind that we focused only on pre- and early-treatment factors associated with new member integration. Given this design, we cannot say how important these factors are relative to endogenous TC processes and other aspects of treatment. Certainly, experiences in the TC matter, which necessitates additional research that goes beyond integration as an outcome to understand integration as a *process* unfolding over time, with likely consequences for reintegration outcomes. Investigations should also focus on *who* residents are connecting to, and how this changes over time, as the integration and engagement of peers can impact one's own. And, although our evaluation is longitudinal and includes nearly 200 residents, it is only one TC unit. TCs have their own cultures and norms, as well as differential fidelity to TC philosophy and practices. This is especially true given that prison-based TCs are considered "modified TCs," adapted to specific institutional environments. An assessment of the TC we studied found low-medium fidelity, with institutional barriers, policies, and staff training deficits relative to the TC model (Kreager et al. 2018b, see Appendix E). Indeed, push-ups and pull-ups, which provide formal program engagement opportunities and have been the subject of prior network TC studies (Doogan and Warren 2017a, 2017b; Kreager et al. 2018a), were largely absent as residents and

administrative staff did not embrace this aspect of the TC model. Thus, we encourage future research into the relational structure of a broader range of TCs. Nonetheless, our results offer evidence that the goal of TC integration may be obtainable even without high fidelity.

It is important to note that although our findings suggest the structure of the TC examined is largely consistent with TC ideals, that does not guarantee a successful TC. Importantly, our study did not examine network processes related to (1) treatment engagement, such as peer influence, or (2) effects on post-release relapse and recidivism. Even if the structure is consistent with the TC model, other peer and treatment processes (e.g., peer selection dynamics or low treatment fidelity) could undermine the “community as method” and lead to poor post-treatment outcomes. Moreover, finding that more motivated residents became more integrated, which is key to success, raises the question of how to enhance integration among those who enter the TC with lower treatment engagement. Our network autocorrelation models revealed that residents who were more integrated clustered together (see also Campbell et al. 2018), which implies that the benefits of treatment may not reach all residents. Thus, future studies should examine the dynamic associations between peer relationships and treatment engagement, and their consequences for trajectories of substance use upon prison release. Lastly, we would recommend more attention to how integration is affected by variations in the adaptation of the TC model to the prison setting (Davidson and Young 2019).

6. CONCLUSION

Prison-based TCs have been consistently linked to positive post-release outcomes, including reduced relapse and recidivism. Relationships underlie the community as method approach and contribute to long-term success in recovery (De Leon 2000), yet the mechanisms underlying their effectiveness are inadequately understood. Discussing the original TC model, De Leon states, “Although much is known about *whether* TCs work in terms of successful outcomes, less is understood as to why and *how* TCs work. The link between treatment elements, treatment experiences, and treatment outcomes must be established to firmly substantiate the specific contribution of the TC to long-term recoveries” (De Leon 2000: 5). This statement is even more applicable when considering how treatment elements have been modified for the correctional setting, often out of pure necessity and not as a result of evidence.

Our study begins to shed light on important mechanisms of integration and engagement within a prison-based TC. Understanding who is successfully integrating into the TC community, and how social processes, the key to all TC mechanisms, affect such integration is a crucial step in understanding the operation of the prison-based TC. Given the prevalence of prison-based TCs, a deeper understanding of mechanisms of integration into the community as method model would offer significant policy implications.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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REFERENCES

- Bauer Tayla N., Ergogan Berrin, Bodner Todd, Truxillo Donaly M. and Tucker Jennifer S.. 2007 “Newcomer Adjustment During Organizational Socialization: A Meta-Analytic Review of Antecedents, Outcomes, and Methods” *Journal of Applied Psychology*, 92: 707–721. [PubMed: 17484552]
- Belenko Steven and Peugh Jordon. 2005 “Estimating drug treatment needs among state prison inmates.” *Drug and Alcohol Dependence*. 77: 269–81. [PubMed: 15734227]
- Bronson Jennifer, Stroop Jessica, Zimmer Stephanie and Berzofsky Marcus. 2017 “Drug Use, Dependence, and Abuse Among State Prisoners and Jail Inmates, 2007-2009.” Bureau of Justice Statistics, U.S. Department of Justice.
- Campbell Benjamin W., Cranmer Skyler, Harvey Carole, and Warren Keith. 2018 “Therapeutic community graduates cluster together in social networks: Evidence for spatial selection as a cooperative mechanism in therapeutic communities.” *Addictive Behaviors*, 79: 74–80. [PubMed: 29253660]
- Cullen Eric. 1994 “Grendon: The therapeutic prison that works.” *Therapeutic Communities*
- Davidson Kimberly M. and Young Jacob T.N.. 2019 “Treatment engagement in a prison-based Therapeutic Community: A mixed-methods approach.” *Journal of Substance Abuse Treatment*, 103: 33–42. [PubMed: 31229190]
- De Leon George. 2000 *The Therapeutic Community: Theory, Model, and Method*. New York: Springer Publishing.
- Doogan Nathan J. and Warren Keith. 2017a “A network of helping: generalized reciprocity and cooperative behavior in response to peer and staff affirmations and corrections among therapeutic community residents.” *Addiction Research & Theory*, 25: 243–250. [PubMed: 29151825]
- Doogan Nathan J. and Warren Keith L.. 2017b “Saving My Life: Dynamics of Peer and Staff Corrections Among Therapeutic Community Residents.” *Substance Use & Misuse*, 52: 1429–1438. [PubMed: 28467267]
- Drake Elizabeth. 2012 *Chemical Dependency Treatment for Offenders: A Review of the Evidence and Benefit-Cost Findings*. Olympia, Wash: Washington State Institute for Public Policy.
- Elreda Lauren M., Coatsworth JD, Gest Scott D., Ram Nilam and Bamberger Katharine. 2016 “Understanding Process in Group-Based Intervention Delivery: Social Network Analysis and Intra-entity Variability Methods as Windows into the Black Box.” *Prevention Science*, 17:925–936. [PubMed: 27582016]
- Harris Heather M., Nakamura Kiminori, and Bucklen Kristofer Bret. 2018 “Do Cellmates Matter? A Causal Test of the Schools of Crime Hypothesis with Implications for Differential Association and Deterrence Theories.” *Criminology* 56(1): 87–122.
- Hiller Matthew L., Knight Kevin, Rao Sandhya R. and Simpson D. Dwayne. 2002 “Assessing and evaluating mandated correctional sub stance-abuse treatment.” *Treatment of Drug Offenders: Policies and Issues* 41–56.
- Kerrison Erin M. 2018 “Exploring how prison-based drug rehabilitation programming shapes racial disparities in substance use disorder recovery.” *Social Science & Medicine* 199: 140–147. [PubMed: 28807487]
- Kreager Derek A., Bouchard Martin, De Leon George, David R. Schaefer, Soyer Michaela, Young Jacob and Zajac Gary. 2018a “A Life Course and Networks Approach to Understanding Prison Therapeutic Communities” In Alwin D, Felmler D, & Kreager D (Eds.), *Social networks and the life course* (pp. 433–451). New York, NY: Springer.

- Kreager Derek A., Schaefer David R., Bouchard Martin, Haynie Dana L., Wakefield Sara, Young Jacob and Zajac Gary. 2016 "Toward a Criminology of Inmate Networks." *Justice Quarterly*, 33:1000–1028. [PubMed: 27616815]
- Kreager Derek A., Schaefer David R., Davidson Kimberly M., Zajac Gary, Haynie Dana L. and De Leon George. 2019 "Evaluating Peer Influence Processes in a Prison-Based Therapeutic Community: A Dynamic Network Approach." *Drug and Alcohol Dependence*. 203:13–18. [PubMed: 31398686]
- Kreager Derek A., Young Jacob T. N., Haynie Dana L., Bouchard Martin, Schaefer David R. and Zajac Gary. 2017 "Where Old Heads' Prevail: Inmate Hierarchy in a Men's Prison Unit." *American Sociological Review*, 82: 685–718. [PubMed: 29540904]
- Kreager Derek A., Zajac Gary, Davidson Kimberly, Haynie Dana L., Schaefer David R., Young Jacob T.N. and De Leon George. 2018b "The Therapeutic Community Prison Inmate Networks Study (TC-PINS): Evaluating Peer-Based Processes in a Prison Substance Abuse Treatment Unit." Report to the Pennsylvania Department of Corrections.
- Kressel David and De Leon George. 1997 Therapeutic Community Client Assessment Summary for Correctional-Based Programs (CAS Scale). Center for Therapeutic Community Research.
- Lau Dora C. and Murnighan J. Keith. 1998 "Demographic diversity and faultlines: The compositional dynamics of organizational groups." *Academy of Management Review*, 23: 325–340.
- Linley Jessica Veneskey, Warren Keith and Davis Tamara S.. 2010 "A Comparison of Affirmations Given and Received by Minority and Non-Minority Status Men in a Correctional Therapeutic Community." *Therapeutic Communities*, 31: 35–47.
- Mandell Wallace, Edelen Maria O., Wenzel Suzanne L., Dahl James and Ebener Patricia. 2008 "Do dimensions of therapeutic community treatment predict retention and outcomes?" *Journal of Substance Abuse Treatment*, 35: 223–231. [PubMed: 18248942]
- Mumola CJ, & Karberg JC 2006 Drug Use and Dependence, State and Federal Prisoners, 2004. Washington, DC: U.S. Dept, of Justice, Office of Justice Programs, Bureau of Justice Statistics.
- McPherson Miller, Smith-Lovin Lynn and Cook James M.. 2001 Birds of a feather: Homophily in social networks. *Annual Review of Sociology* 27:415–44.
- Mitchell Ojmarrh, Wilson David B. and MacKenzie Doris L.. 2012 "The Effectiveness of Incarceration-Based Drug Treatment on Criminal Behavior: A Systematic Review." *Campbell Systematic Reviews* 2012:18.
- Moody James and White Douglas R.. 2003 Structural Cohesion and Embeddedness: A Hierarchical Concept of Social Groups. *American Sociological Review*, 68: 103–127.
- Morrison Elizabeth W. 2002 Newcomers' relationships: The role of social network ties during socialization. *Academy of Management Journal*, 45: 1149–1160.
- National Institute on Drug Abuse (NIDA). 2015 "Therapeutic Communities." Research Report Series. <http://www.drugabuse.gov/publications/research-reports/therapeutic-communities/what-are-therapeutic-communities>
- Patkar Ashwin A., Thornton Charles C., Berrettini Wade H., Gottheil Edward, Weinstein Stephen P. and Hill Kevin P.. 2002 "Predicting treatment-outcome in cocaine dependence from admission urine drug screen and peripheral serotonergic measures." *Journal of Substance Abuse Treatment* 23: 33–40. [PubMed: 12127466]
- Paul I Rosen, Hiller Matthew L., Webster J. Matthew, Staton Michele and Leukefeld Carl. 2004 "Treatment motivation and therapeutic engagement in prison-based substance use treatment." *Journal of Psychoactive Drugs* 36: 387–396. [PubMed: 15559685]
- Schaefer David R. and Kreager Derek A.. "New Kids on the Block: Analyzing Network Selection Trajectories in a Prison Treatment Program." *American Sociological Review*. In press.
- Schaefer David R., Bouchard Martin, Young Jacob T. N. and Kreager Derek A.. 2017 "Friends in Locked Places: An Investigation of Prison Inmate Network Structure." *Social Networks*, 51:88–103. [PubMed: 28983147]
- Simpson D. Dwayne, Joe George W., Fletcher Bennett W., Hubbard Robert L., and Anglin M. Douglas. 1999 "A national evaluation of treatment outcomes for cocaine dependence." *Archives of General Psychiatry* 56: 507–514. [PubMed: 10359464]

- Stevens Alisa. 2013 *Offender Rehabilitation and Therapeutic Communities: Enabling Change the TC Way*. Abingdon, Oxfordshire: Routledge.
- Steyee J 2014 *Program Performance Report: Joint Enhancement Grantees of the Adult Drug Court Discretionary Grant Program*. Washington, DC: Bureau of Justice Assistance, U.S. Department of Justice.
- Taxman Faye S., Perdoni Matthew L. and Harrison Lana D.. 2007 “Drug Treatment Services for Adult Offenders: The State of the State.” *Journal of Substance Abuse* 32: 239–254.
- TCU Institute of Behavioral Research. 2014 “Texas Christian University Drug Screen V.” Fort Worth, TX.
- Van Orden Kimberly, A., Cukrowicz Kelly C., Witte Tracy K. and Joiner Thomas E. 2012 “Thwarted Belongingness and Perceived Burdensomeness: Construct Validity and Psychometric Properties of the Interpersonal Needs Questionnaire.” *Psychological Assessment* 24: 197. [PubMed: 21928908]
- Vanderplasschen Wouter, Colpaert Kathy, Autrique Mieke, Richard Charles Rapp Steve Pearce, Broekaert Eric, and Vandavelde Stijn. 2013 “Therapeutic communities for addictions: a review of their effectiveness from a recovery-oriented perspective.” *The Scientific World Journal*.
- Warren Keith, Campbell Benjamin, Cranmer Skyler, De Leon George, Doogan Nathan, Weiler Mackenzie, and Doherty Fiona. 2020 “Building the Community: Endogenous Network Formation, Homophily and Prosocial Sorting among Therapeutic Community Residents.” *Drug and Alcohol Dependence* 207: 107773. [PubMed: 31812853]
- Warren Keith L., Doogan Nathan , De Leon George, Phillips Gary S., Moody James and Hodge Ashleigh. 2013 “Short-Run Pro-social Behavior in Response to Receiving Corrections and Affirmations in Three Therapeutic Communities.” *Journal of Offender Rehabilitation*, 52: 270–286. [PubMed: 23935258]
- Welsh Wayne N. 2007 “A multisite evaluation of prison-based therapeutic community drug treatment.” *Criminal Justice and Behavior* 34(11): 1481–1498.
- Welsh Wayne N. and McGrain Patrick N.. 2008 “Predictors of therapeutic engagement in prison-based drug treatment.” *Drug and Alcohol Dependence* 96(3): 271–280. [PubMed: 18486361]
- Welsh Wayne N., Zajac Gary and Bucklen Kristofer Bret. 2014 “For whom does prison-based drug treatment work? Results from a randomized experiment.” *Journal of Experimental Criminology*, 10: 151–177.
- Whichard Corey, Schaefer David R. and Kreager Derek A.. “Charting the Hidden City: Collecting Prison Social Network Data.” *Social Networks*. In press

Highlights

- Prison-based therapeutic communities (TCs) are built on a network philosophy.
- We gathered 10 waves of monthly data from a Pennsylvania men's TC.
- Network structure and resident integration were consistent with TC principles.
- Network contacts and treatment engagement drove individual integration into the TC.

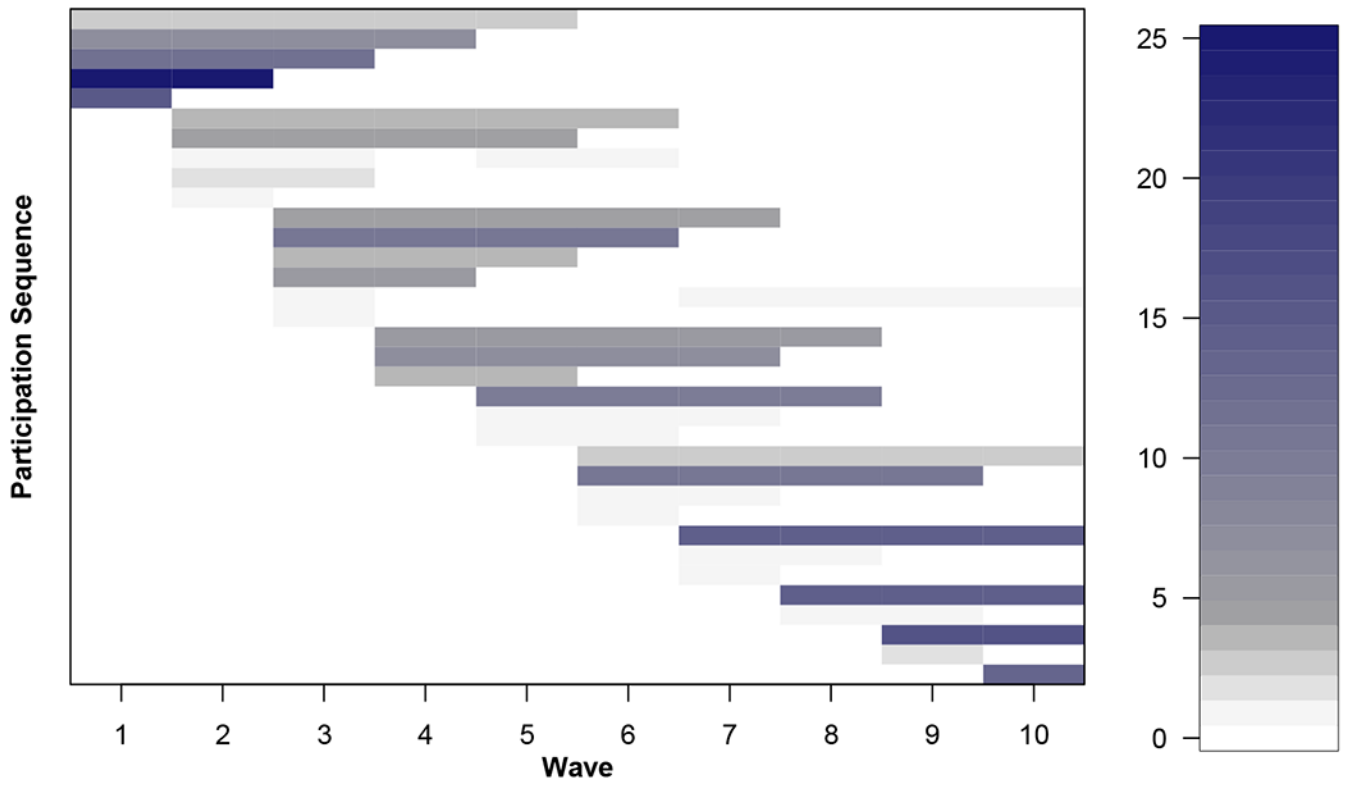


Figure 1.
Survey Participation Sequence Frequencies

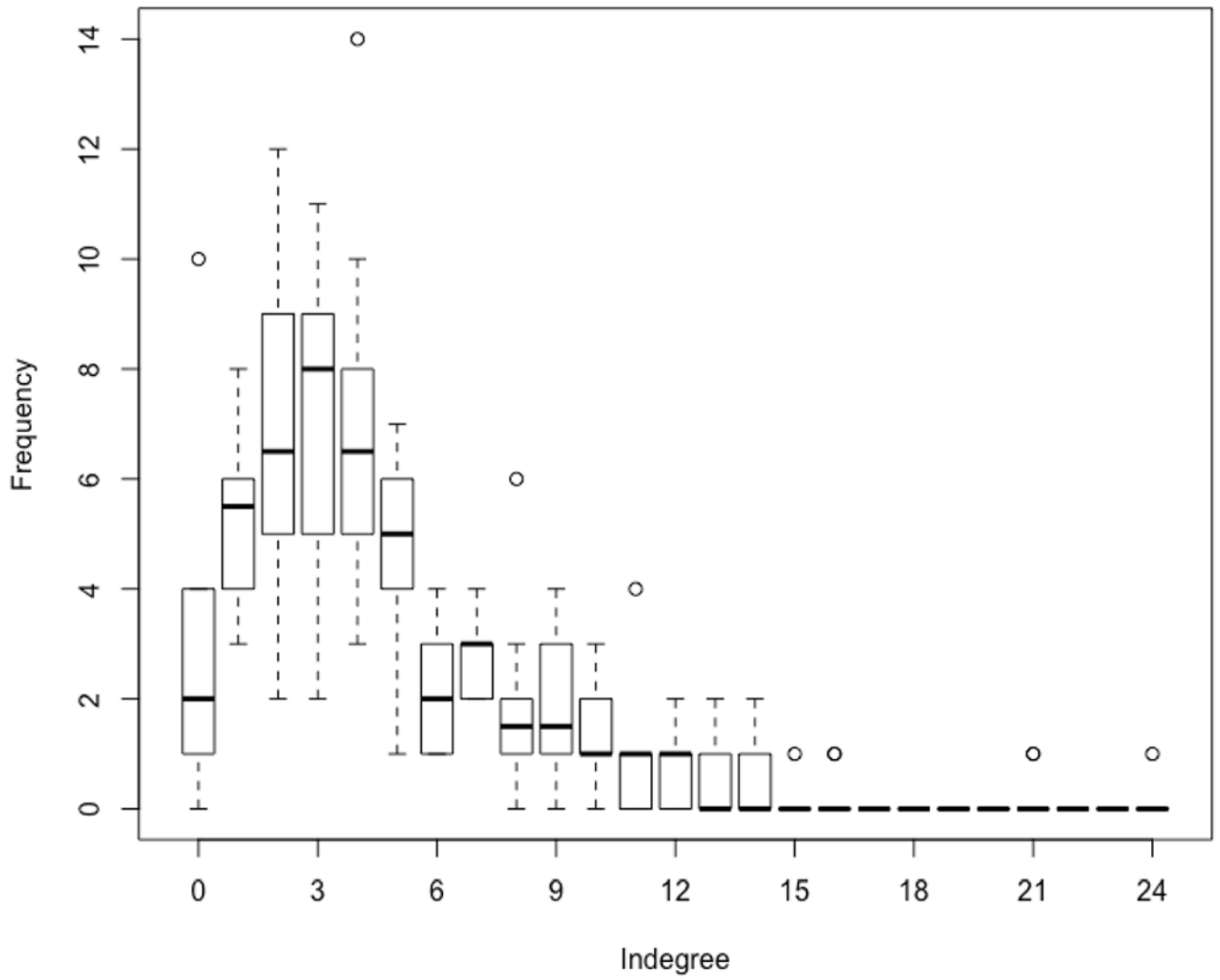


Figure 2.
Indegree Distributions for each Wave

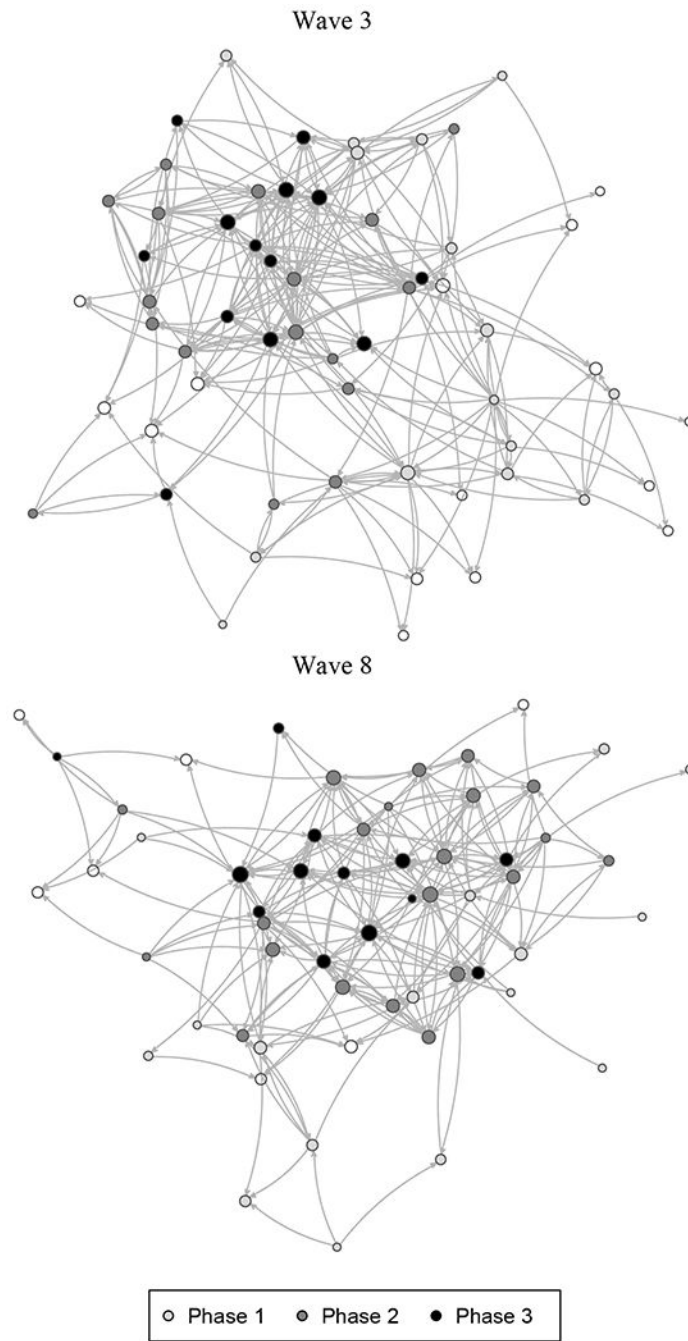


Figure 3.
Get along with network (node size corresponds to number of incoming ties)

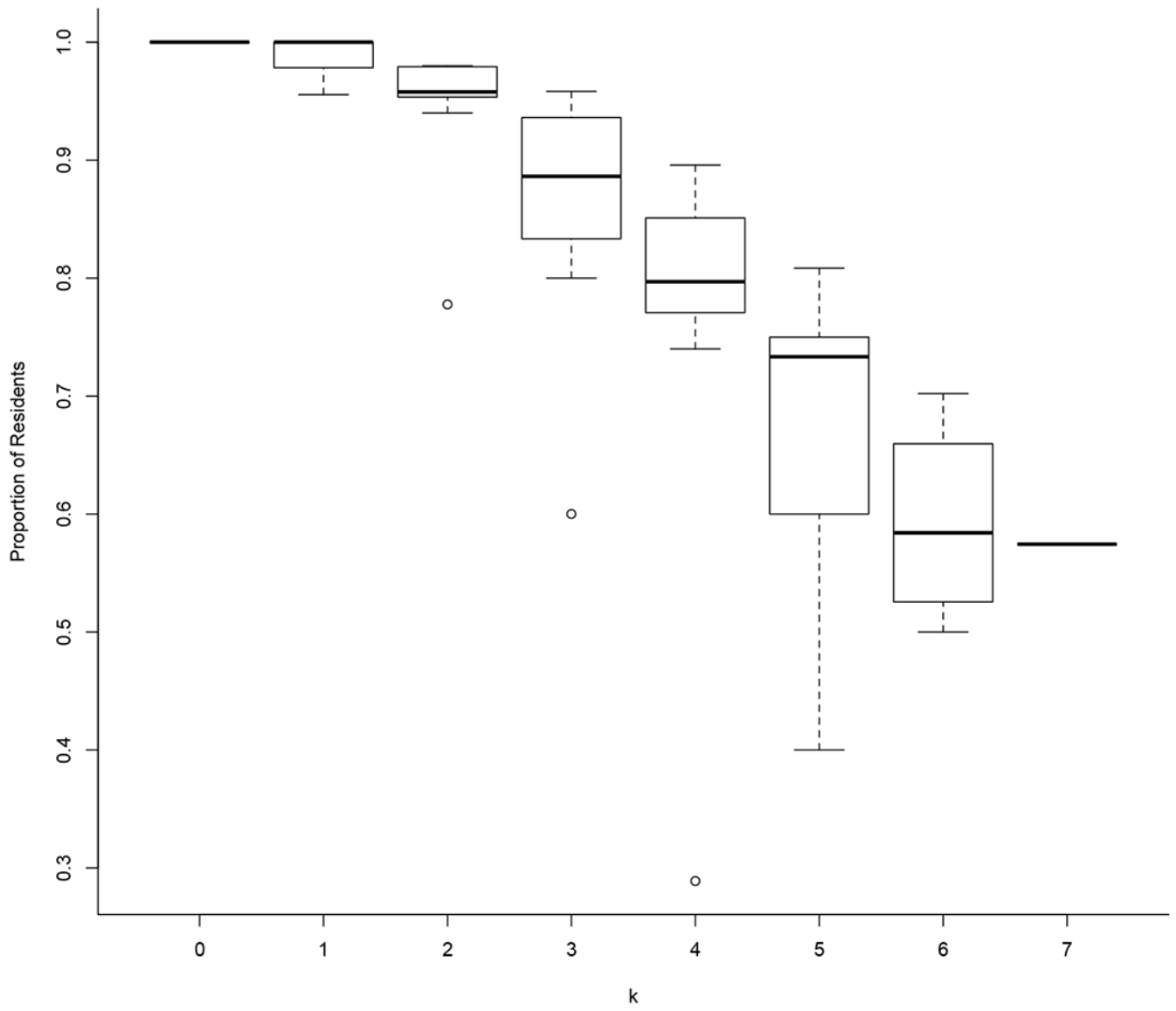


Figure 4. Structural Cohesion: proportion of residents belonging to largest component by value of k

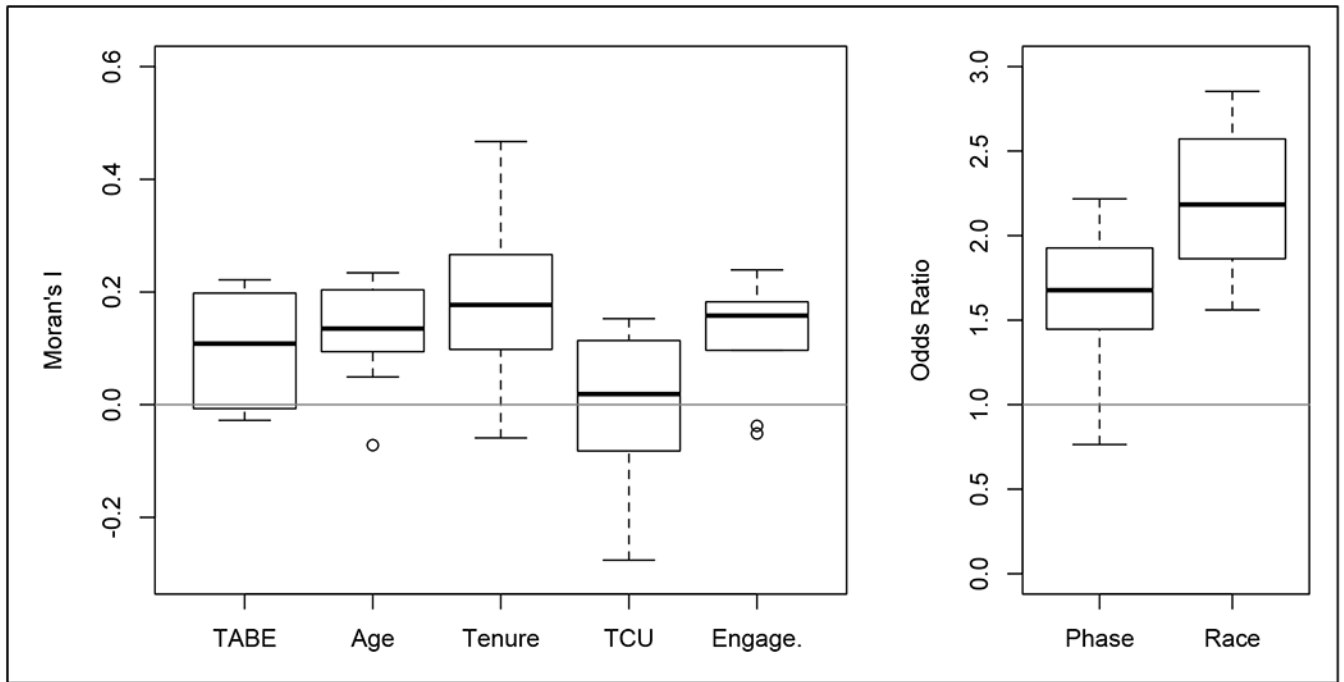


Figure 5. Summary of Monthly Measures of Homophily on Resident Attributes

Table 1.

Descriptive Statistics: Integration Outcome Measures (N=170)

	M	SD	Range	Correlations ^A						
				(1)	(2)	(3)	(4)	(5)	(6)	
(1) Max. outdegree	7.74	4.77	0-28	1						
(2) Max. indegree	6.42	3.01	0-17	.18	1					
(3) Max. mutual ties	2.79	1.69	0-9	.52	.61	1				
(4) Ever big brother	.55	--	0-1	.16	.24	.18	1			
(5) Ever role model	.62	--	0-1	.18	.36	.29	.27	1		
(6) Social belonging	3.84	.56	2-5	.26	.21	.27	.16	.17	1	

^AAll $p < .05$

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Table 2.

Descriptive Statistics: Independent Variables (N=170)

	Mean, %	SD	Min	Max
<i>Controls</i>				
Black	32.94%	--	0	1
Hispanic	8.24%	--	0	1
White	57.64%	--	0	1
Other Race/ethnicity	1.18%	--	0	1
Education (TABE)	94.11	30.80	32	130
Age	35.85	10.46	20.96	63.57
Prison tenure (log days)	5.63	1.16	3.87	8.79
Prior acquaintance	66.47%	--	0	1
Wave 9 entry	7.06%	--	0	1
<i>Treatment Factors</i>				
TCU Score	6.70	1.19	3	9
Initial engagement	3.80	.52	2.14	4.93
<i>Network Factors</i>				
Cellmate integration	9.26	5.48	1	29
Big brother integration	5.31	6.31	0	29
Prior acquaintance integration	6.41	6.35	0	27
<i>Unit Composition</i>				
Mean engagement	3.87	.10	3.47	4.10

Table 3.

Correlations between Integration Outcomes and Predictors (N=170)

	Outdegree	Indegree	Mutual Ties	Big Brother	Role Model	Social Bel.
Black	.08	-.13 [†]	-.06	.11	.03	.06
Hispanic	.02	-.02	.06	-.03	-.03	.04
Education (TABE)	-.03	.16 [*]	.12	-.11	.15 [†]	-.07
Age	.16 [*]	-.20 ^{**}	-.09	-.01	.10	-.05
Prison tenure	-.14 [†]	-.18 [*]	-.21 ^{**}	-.02	.00	-.15 [†]
Prior acquaintance	-.09	.20 ^{**}	.12	.00	.04	.04
Wave 9 entry	-.22 ^{**}	-.24 ^{**}	-.21 ^{**}	-.26 ^{***}	-.07	-.21 ^{**}
TCU Score	.09	.04	.14 [†]	.04	.11	.00
Engagement	.24 ^{**}	.02	.09	.19 [*]	.13 [†]	.43 ^{***}
Cellmate integration	.01	.24 ^{**}	.16 [*]	.18 [*]	.19 [*]	.04
Big brother integration	.14 [†]	.07	.06	-.03	.10	.25 ^{***}
Prior acquaint. integrat.	.12	.18 [*]	.20 ^{**}	.10	.06	.01
Mean engagement	.08	.18 [*]	.09	.08	.08	.10

[†] $p < .10$;^{*} $p < .05$;^{**} $p < .01$;^{***} $p < .001$ (two-tailed tests).

Table 4. Network Autocorrelation Regression of Integration Outcomes on Predictors (N=170)

	Outdegree ^A		Indegree ^A		Mutual Ties ^A		Big Brother ^B		Role Model ^B		Social Belong. ^C	
	b	se	b	se	b	se	b	se	b	se	b	se
Autocorrelation	.05	.02 †	.08	.03 **	.15	.07 *	3.09	.98 **	1.45	.90	-.04	.08
Intercept	-.90	2.04	-.94	1.55	-.92	2.22	-5.21	8.12	-9.85	8.22	-.53	1.68
Black	.06	.11	-.07	.09	.04	.12	-.21	.46	.25	.46	-.07	.09
Hispanic	.16	.18	-.09	.15	.25	.19	.28	.76	-.60	.76	.14	.15
Education (TABE)	.00	.00	.00	.00	.00	.00	-.01	.01	.01	.01 *	.00	.00
Age	.01	.00	-.01	.00 †	.00	.01	-.02	.02	.02	.02	-.01	.00
Prison tenure	-.08	.04 †	-.03	.03	-.09	.05 †	.07	.18	.03	.18	.00	.04
Prior acquaint.	-.19	.10 †	.14	.08 †	.07	.12	-.15	.43	.08	.43	.11	.09
Wave 9 entry	-.55	.26 *	-.28	.18	-.47	.27 †	-2.39	1.17 *	.90	.80	-.42	.16 *
TCU Score	.03	.04	-.02	.03	.03	.04	-.02	.15	.13	.16	-.03	.03
Engagement	.24	.09 *	.07	.07	.14	.10	.83	.38 *	.42	.39	.50	.08 ***
Cellmate integration	-.01	.01	.01	.01 *	.01	.01	.06	.04	.11	.04 *	.00	.01
Big brother integration	.01	.01	.00	.01	.00	.01	.00	.03	.06	.03 †	.02	.01 **
Prior acquaint. integr.	.02	.01 *	.00	.01	.01	.01	.02	.03	.02	.03	-.01	.01
Mean engagement	.41	.52	.54	.40	.23	.57	.21	2.10	.87	2.08	.81	.42 †

† $p < .10$;
 * $p < .05$;
 ** $p < .01$;
 *** $p < .001$ (two-tailed tests).

Note. Reference category is White and other race/ethnicity, entered study waves 1–8, and no known co-residents upon unit entry

^AQuasi-poisson specification

B Logit specification
 C Gaussian specification
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Table 5:

Description of resident connectedness across waves (N=210)

Wave	Connected Residents (Unit)	Connected Residents (Sample)	Avg. Degree ^A M (SD)	Avg. Degree (Mutual Ties) M (SD)
1	93.5%	97.9%	4.83 (4.09)	1.67 (1.51)
2	98.3%	100.0%	5.19 (3.94)	1.91 (1.63)
3	96.8%	100.0%	4.64 (3.34)	2.00 (1.67)
4	98.4%	95.6%	2.58 (2.65)	.89 (1.01)
5	98.4%	100.0%	4.28 (3.92)	1.56 (1.33)
6	95.2%	98.0%	5.18 (4.09)	2.12 (1.74)
7	93.4%	100.0%	4.31 (2.55)	1.88 (1.21)
8	95.1%	98.0%	4.48 (3.20)	1.72 (1.69)
9	98.4%	97.9%	4.96 (3.79)	1.74 (1.47)
10	86.9%	97.7%	4.56 (3.15)	2.05 (1.56)
Mean	95.4%	98.5%	4.50	1.75

^AWe use the term *degree* since the average indegree for a wave equals average outdegree

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Table 6:Mean Odds of a Get-Along Tie by Sender and Receiver Phase (Range in Parentheses)^A

		Receiver Phase		
		1	2	3
Sender Phase	1	1.40 (.39, 3.63)	1.42 (.52, 2.58)	.74 (0, 1.92)
	2	.35 (.21, .77)	1.65 (.80, 3.17)	1.34 (.59, 2.17)
	3	.21 (0, .65)	1.17 (.73, 1.51)	2.21 (.89, 3.23)

^AOdds of sender naming someone in the respective phase, relative to someone in another phase

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