The evolution of social networks in a group-based mentoring program for vulnerable teens: What types of relationships matter most?

Neil D. Yetz, M.P.H., M.S. candidate

Colorado State University

Thesis Proposal

ABSTRACT

ACKNOWLEDGEMENTS

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CHAPTER I: INTRODUCTION

When an adolescent is struggling to develop in a positive way, an adult mentor can be a catalyst for change (Wesely, Dzoba, Miller, & Rasche, 2017). As a result, numerous mentoring programs for at-risk adolescents have emerged, including Big Brothers Big Sisters of America (https://www.bbbs.org/) and MENTOR (https://www.mentoring.org/). Alongside these traditional dyadic mentoring programs (i.e., one mentor, one mentee), group-based mentoring programs are another common structure. In these programs, one mentor may be matched with multiple mentees or mentor-mentee pairs may participate in larger group settings. Examples of group-based mentorship programs include Campus Connections (https://www.chhs.colostate.edu/cc/) and Go Girls! (https://www.bbbso.ca/programs/go-girls/). While mentoring programs of various types and styles are ubiquitous in communities across the US, findings from meta-analytic reviews indicate that the treatment effects of mentoring interventions vary widely across programs, structures, and outcomes (DuBois, Portillo, Rhodes, Silverthorn, & Valentine, 2011). Thus, efforts to maximize treatment efficacy is needed, and this endeavor requires focused research.

The fundamental element of any mentoring program is the bond that the mentee forms with others in the program. That is, with their mentor, in the case of a dyadic mentoring program. Or, in the case of group-based mentoring programs, with mentors and other mentees. Thus, one approach to improving mentoring treatment effects is to optimize the bonds and friendships cultivated during the mentoring program. In this thesis, my focus is on enhancing the treatment effects of group-based mentoring programs in particular. Mentees have an opportunity to build relationships with many different individuals in a group-based mentoring program, thus, it is important to consider what types of bonds are most important for treatment effects to be

realized. That is, to discover what types of relationships with other members of the group are most associated with positive program outcomes. For example, is it most important for a mentee to develop a close bond with their primary mentor, and/or with a set of mentors, and/or with other mentees in the program? If clarity about the most important relationships for an adolescent to cultivate during a group-based mentoring program can be gained, then this information may be used to restructure programs to maximize positive treatment effects.

In this thesis, I will characterize the evolution of the social network of mentees participating in a 12-week, group-based mentoring program for at-risk adolescents. Characterization of each mentee's social network over the course of the program will involve assessment of the number and strength of bonds with their primary mentor, with other mentors and adult staff, and with other mentees participating in the program. Measures of the social network will be collated and then used as predictors of a key program mediator (sense of belonging in the program) and several key program outcomes (i.e., academic performance, depression, anger, and delinquent behaviors). In this way, new insights into the types of relationships most salient for positive program outcomes may be discovered.

Adolescence – a critical time for intervention

Decades worth of research demonstrates that adolescence is a unique and consequential developmental period (Steinberg, 2007), and adolescents cannot be simply considered older children or younger adults (Crosnoe & Johnson, 2011). Numerous biological changes occur during adolescence. For example, pubertal development has been associated with increased activation of the frontal lobe, pruning and myelination of the brain (Paus, Keshavan, & Giedd, 2008; Steinberg, 2007). Additionally, there is enhanced capacity to the dopaminergic reward

system of the brain (Siegel, 2015). Changes in the nucleus accumbens, a brain area associated with reward seeking, have also been seen in adolescent development (Galvan et al., 2006).

Amidst these critical biological developments, adolescents are prone to impulsivity, sensation-seeking, and inaccurate assessment of vulnerability (Steinberg, 2007). Thus, health-risking behaviors (Arthur et al, 2002; Broidy et al, 2003; Resnick et al., 1997), including substance use (Henry, Thornberry, & Huizinga, 2009), unsafe sexual practices (Myklestad & Rise, 2007) and violence (Resnick et al, 1997; Reiss & Roth, 1993) are most common during this developmental period. Longitudinal models indicate that depressive symptoms are often formed during adolescence (J. R. Cohen, Andrews, Davis, & Rudolph, 2018). Additionally, adolescents are at risk for various psychiatric illnesses such as schizophrenia, substance use disorders, and anxiety disorders (Paus et al., 2008). Such disorders have been found to continue into adulthood (Rohde et al. , 2013). Indeed, adolescence is a critical period for development, prosocial behaviors and the key to lifelong health and well-being. Interventions designed to maximize health and prosocial development during adolescence are of critical importance.

Certain personal and contextual factors increase the likelihood that an exposed adolescent will engage in risk behaviors, particularly risk behaviors that threaten prosocial and healthy development. In the literature, young people exposed to these risk factors are commonly labeled as *at-risk adolescents*. These personal and contextual factors can negatively contribute to an individual's ability to thrive academically, socially, emotionally, and/or physically (Mcdaniel & Yarbrough, 2016). At-risk adolescents have the potential to escalate problem behaviors, such as drug abuse (Mcdaniel & Yarbrough, 2016), poor academic performance (Malecki & Demeray, 2006) and school misconduct (Schmidt, 2003). Given these considerations, preventive efforts are needed to minimize behavioral difficulties amongst at-risk adolescents. This is particularly

salient for the design of interventions, as many existing interventions for adolescence are specifically designed for at-risk adolescents (Raposa et al., 2019). These complexities will be discussed in terms of the current thesis in subsequent sections.

Mentorship Interventions

One promising intervention to promote positive adolescent outcomes among at-risk youths is mentorship. Mentorship programs provide adolescents with a role model straight from the community in which they both reside. Mentors are encouraged to enhance their mentee's coping strategies, help their mentee reduce stressors, and create an attachment to the youth mentee (DeWit et al, 2016). Meta-analytic reviews show that adolescents in mentorship programs improve in behavioral and psychosocial outcomes as compared to their non-mentored counterparts (DuBois et al., 2011; Tolan, Henry, Schoeny, Lovegrove, & Nichols, 2014). A more recent meta-analysis found the averaged effect size of mentorship interventions across several outcomes (i.e. cognitive functioning, psychological, health) to be $\bar{g} = 0.21$ (Raposa et al., 2019), which constitutes a small effect size in terms of Cohen's (1988) behavioral sciences effect size guidelines and a medium/moderate effect size in terms of universal youth prevention programs (Tanner-Smith, Durlak, & Marx, 2018). However, results are not always positive. For example, a meta-analytic review by Wood and Mayo-Wilson (2012) found mentorship intervention effect sizes to be small-, and in some cases iatrogenic, for academic achievement, attendance and negative behavior (i.e., school misconduct, drug use). Thus, while mentoring is considered an evidence-based practice, more work to understand for whom and under what conditions mentoring leads to better outcomes for participants is needed.

The promises and perils of group-based mentoring initiatives

This thesis is focused specifically on group-based mentoring, which carries its own set of potential promises and perils. A group-based approach to mentorship can have several benefits. For example, group-based mentoring allows programs to serve a larger number of youths at once. Similar to dyadic (one on one) mentoring, group mentorship has seen promotions in resiliency and prosocial attitudes (Kuperminc, Chan, Hale, Joseph, & Delbasso, 2019; Weiler et al., 2015). However, group-based mentoring can also produce challenges. If the group-based mentoring program is focused on exclusively at-risk adolescents, then the act of congregating the at-risk adolescents may produce unwanted outcomes. This phenomena is described by Dishion and colleagues as deviancy training (Dishion, Eddy, Haas, Li, & Spracklen, 1997). Deviancy training is the process in which congregated deviant youth have a tendency to endorse and encourage negative and rule-breaking behavior (Poulin, Dishion, & Haas, 1999). Unfortunately, at-risk youth in group-based mentorship programs may be at risk to learn negative behaviors from each other as a result of deviancy training (Dishion & Tipsord, 2011). Friendship networks, formed during group interventions for at-risk youth, can be a root cause of deviancy training (Dishion & Tipsord, 2011; Poulin et al., 1999). Group-based mentorship interventions need to be aware of such unintended consequences.

There are effective strategies to prevent social deviancy in group interventions. Some protective moderators against the effects of deviancy training include adult monitoring, supervision, and structure (Dishion & Tipsord, 2011). Despite the known protective factors against negative deviancy training, not all group-based mentorship programs may utilize positive practices.

Youth mentoring programs have a rich history of providing positive outcomes to youth. For one, youth that participate in youth mentoring programs are much more likely to graduate

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from high school as opposed to their non-mentored counterparts (J. Rhodes, 2005). Research also indicates that youth with a mentor have better school attendance outcomes and better attitudes towards school (Jekielek, Moore, Hair, & Scarupa, 2002). Additionally, youth with volunteer mentors are less likely to partake in delinquent behaviors (J. Rhodes, 2005). However, differences in outcomes exist for group mentoring programs. In general, group mentoring show less effects in terms of academic outcomes compared to traditional dyadic mentoring programs (Cummings, 2010). However, group mentoring programs show promising effects in terms of prosocial outcomes (i.e. delinquency, behavior problems; Deutsch, Reitz-Krueger, Henneberger, Futch Ehrlich, & Lawrence, 2017). ~~XX~~

Belongingness as an Intermediate Goal of Group-based Mentoring Programs

An important aspect of any group-based mentorship program is perceived belongingness to the program. Belongingness is the need to gain acceptance within a community (Malone, Pillow, & Osman, 2012) and is, furthermore, an essential psychological need (Galliher, Rostosky, & Hughes, 2004). Belongingness has been studied for decades in adolescent research (Slaten, Rose, Bonifay, & Ferguson, 2018). Baumeister & Leary (1995) explain that belongingness is a fundamental part of forming relationships with adolescent peers. Prior evidence suggests that youth who report a greater sense of belonging are more likely to have higher levels of expressed relationship satisfaction (Marsh & Evans, 2009). Additionally, research conducted by Gummaden, Pittamen and Ioffe (2016) showed having a higher sense of belonging in school has positive impacts on psychological well-being. This general benefit of feeling a sense of belonging is likely extended to belonging within youth programs. For instance, measures of belonging have been positively correlated with program attendance in youth development programs (Anderson-Butcher & Conroy, 2002).

Developing a sense of belonging for youth is often a central goal of youth programs (Anderson-Butcher & Conroy, 2002). As such, a deep understanding of how belongingness is formed is essential. Two such features that lead to enhanced belonginess in youth interventions are group characteristics and staff practices (Akiva, Cortina, Eccles, & Smith, 2013). ~~Children of similar age range and SES have been shown to have increased belongingness in youth programs (Akiva et al., 2013) and therefore, needs to be considered when measuring belongingness in a group intervention program.~~

We can also explain the need to measure belongingness from a theoretical perspective. Maslow (1943) famously indicates love and belonging as the third tier on the hierarchy of human needs. Thus, explaining its importance to humans and adolescents alike. Additionally, prosocial bonds between youth are theoretically and empirically implicated in the development of delinquent behavior (Hirschi, 2017). As such, it is important to examine an adolescent's feeling of belongingness they form while participating in a social program focused on building positive friendships with peers.

A sense of belongingness in a group-based mentoring program is likely a necessary intervening variable that links program participation with the ultimate desired outcomes (e.g., decreased depression). That is, I hypothesize that a sense of belonging must be realized in order for a child to benefit from a group-based mentoring program. Without a sense of belonging, the benefits of the program will be depleted.~~–~~ There is empirical support for this notion. Belongingness has been shown to mediate the relationship between social connections and achievement outcomes (Walton, Cohen, Cwir, & Spencer, 2012). Overall, people feel an innate need to maintain positive social bonds with one another (Baumeister & Leary, 1995). ~~As such~~Furthermore, belonging to a group has a deep and profound impact on our attitudes and

behaviors (G. L. Cohen, 2003; Walton et al., 2012). As such, a youth must gain a sense of belongingness to feel the effects of the program. Belonginess serves as an important mediator in any group-based program.

The feeling of belonging may be formed by social connections. Even a small, weak, connection may cause a sense of mere belongingness (Walton et al., 2012). For example, Cwir and colleagues (2011) found that sharing preferences with a confederate stranger increased emotions and physiological arousal of a participant. Findings from Cwir and colleagues (2011) illustrate the impact of having even a subtle feeling of social connectedness. Further research shows belongingness predicts youth protective factors, such as engagement in a youth program (Anderson-Butcher & Conroy, 2002).

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For my thesis, I plan to exhibit belongingness as an important mediator between social ties and several key developmental outcomes (e.g. academic achievement, anger, depression). My specific model can be seen in Figure 1. As can be seen in Figure 1, I predict that more social ties will be associated with a greater sense of belongingness, and a greater sense of belongingness will be associated with improved developmental outcomes. From this model, I will be able to identify the indirect effect (a*b path) of social ties through belongingness. The c' path will represent the direct effect of social ties on the developmental outcomes.

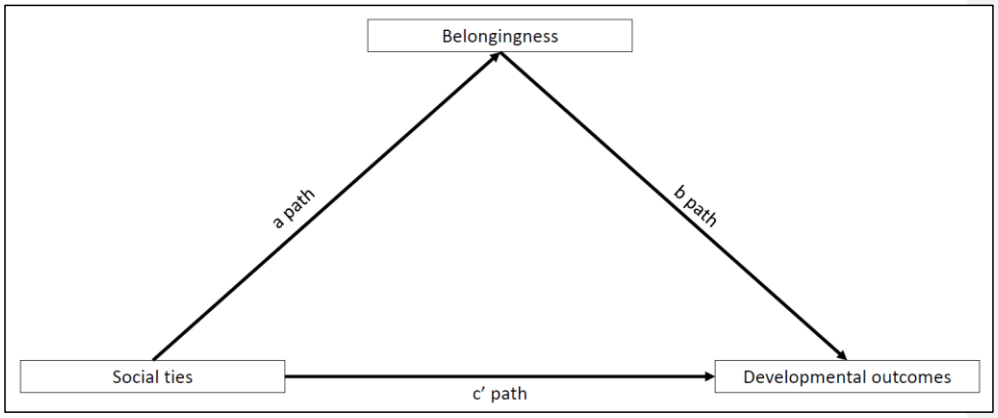

Figure 1. Proposed mediation model.

Social Networks

~~Understanding what contributes to the development of deep relationships~~For this thesis, I plan to understand how social ties lead to a sense of belonging, which will be a prime mediator to experiencing key outcomes (i.e., academic performance, depression, anger, and delinquent behaviors). ~~which may lead to an increased sense of belonging, is a key component to this thesis~~. Social network analysis (SNA) is a path to understand that. For my thesis, I plan to use social network statistics derived from SNA to answer my research questions. A social network approach will shed light on how adolescents in a group-based intervention can develop an enhanced sense of belonging as they develop bonds to other individuals in the program, and ultimately, how the development of bonds with others and the resulting sense of belonging in the program can pave the way for better developmental outcomes for participants. Using a social network approach, I can help to identify what aspects of bonds formed in a mentorship intervention may contribute the most to an adolescent's sense of belonging and ultimately to

better developmental outcomes. In this section, I describe SNA in greater detail and SNA will be used to answer my research questions.

Defining Social Networks and Social Network Statistics~~SNA~~

A social network is the structure of relationships that connect people within a defined population. Every network consists of a set of actors with defining characteristics (nodes) and lines to represent the connections between them (known as ties or edges). The ties are directed, indicating whether the relationship is one-sided or reciprocal. For example, consider Figure 2, which depicts potential relationships between two nodes. In panel 1, Node A reports an outgoing connection with Node B, but Node B reports no connection with Node A (no incoming tie from Node B to Node A) – this is an unreciprocated tie. In panel 2, Node A reports a connection with Node B and Node B reports a connection with Node A – this is a reciprocated tie. Panel 3 presents a more complex social network with many nodes. Notice that some nodes (e.g, Node A) have many outgoing ties (i.e., the actor reports that he has a connection with many other actors) while other nodes (e.g., Node G) reports few connections with other actors. Some nodes (e.g., Node B) have many reciprocated connections, while others have few reciprocated connections (e.g., Node C). Notice that some Nodes (e.g., Node D) are very well connected in the network, they have may incoming and outgoing ties, while other nodes (e.g., Node F) are not well connected in the network, and there is even one node (Node H) which is completely isolated (they have no incoming or outgoing ties).

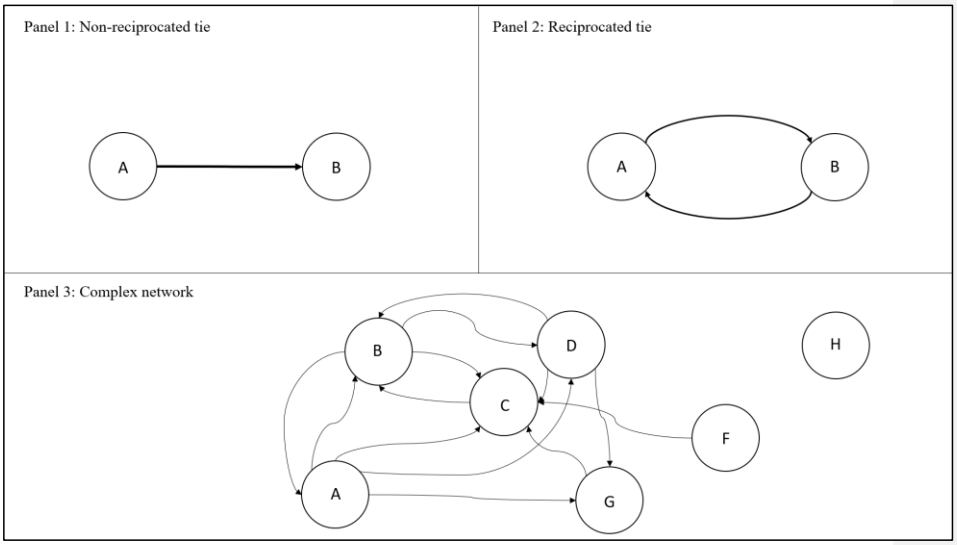

Figure 2. Three panels representing nodes and ties.

Social networks are analyzed via social network analysis (SNA), a vast set of techniques that allow for the quantitative assessment of networks, including all of the quantities touched on in my earlier example (e.g., number of incoming ties, number of outgoing ties, number of reciprocated ties, centrality in the network for each node), and much more (Kadushin, 2012; Valente, 2010). SNA is the process of understanding social structures quantitatively through network theory and graph theory (Butts, 2008). A wide array of statistics can be derived from social network analysis – often called network statistics. Network statistics allow researchers to quantitatively measure all levels of a social structure (Krause, Croft, & James, 2007). Network statistics may be represented at the person-level or network-level. On a person-level, any single node may be analyzed in terms of its centrality (the number of incoming and/or outgoing ties). From here, we may evaluate whom has the most social capital in a network and what attributes (i.e. age, gender) are related to having social capital. On the network-level, we are interested in

the structure the network takes. Network density is one such network statistic that evaluates the whole network. Network density is the proportion of actualized network ties to the total possible number of ties (Giuffre, 2015). The denser the network, the more possible connections are formed. ~~In addition to quantifying the network ties, attributes of the nodes can also be introduced in SNA. For example, nodes may be described by their gender, age, or in the present example, their role in the program (i.e., mentor or mentee).~~

Proposal

This study aims to quantify each mentee's connections with their primary mentor, with other mentors, and with mentees using SNA, and then to study how these various connections with others in the program are related to the mentee's sense of belonging in the program and to their improvement in a set of key developmental outcomes (i.e., academic performance, depression, anger, and delinquent behaviors) ~~(LIST)~~ over the course of the intervention. The reasoning for this approach is to understand which relationships matter most in an adolescent mentorship program. I hypothesize that as youth's social network grows over the course of the intervention, their sense of belonging will also grow. However, the comparative effects of connections with each relevant party (primary mentor, other mentors, mentees) on growth in sense of belonging will be exploratory. Furthermore, I aim to expand our understanding of the most pertinent relationship ties in a mentorship intervention by analyzing which types of ties (i.e. ties with the mentor vs. ties with other youth in the program) are most associated with improvement in the developmental outcomes, and the extent to which a sense of belonging in the program mediates the effect of social ties on improvement in these developmental outcomes.

CHAPTER II: METHODS

Study Protocol

Data for this project were collected from youth who participated in the Campus Connections (CC) mentoring intervention at Colorado State University (CSU). Campus Connections at CSU is a mentoring program for youth at heightened risk for poor developmental outcomes, such as behavioral and emotional problems. It is flexibly designed to respond to the needs of a heterogeneous group of youth with varying risk levels and is grounded in theoretical and empirical research on positive youth development settings (Eccles & Appleton Gootman, 2002; Kelly, Ryan, Altman, & Stelzner, 2000; Tseng & Seidman, 2007) and Rhodes' model of youth mentoring (J. E. Rhodes, 2005). See Haddock et al. (2013) and Weiler et al. (2015) for complete information on the program model.

At Campus Connections, youth are paired one-on-one with an undergraduate student who is enrolled in a 3-credit service-learning course for 12 weeks. The mentoring dyad meets four hours per week on campus and engages in a semi-structured program including "walk and talks," academic support, dinner and other prosocial ~~XX~~activities. Youth are constantly encouraged to engage in community so they may gain a sense of belonging and mattering, develop social skills, and realize leadership skills. There are additionally Marriage and Family Therapist (MFT) students and other trained staff around to help support youth and mentors. The MFT students and staff are trained to facilitate relationships between the mentors and mentees at CC.

Data were collected as part of a three-year grant funded by the William T. Grant (WTG) foundation to study two versions of a youth mentoring program. The first involved traditional dyadic mentoring, in which one mentor was assigned to one mentee to experience the 12-week program together. The second involved nesting 4 mentor-mentee pairs which were called mentor

families. As a result, mentees were exposed to both a mentor of their own, as well as to 3 other mentor-mentee pairs in their mentor family over the course of the 12-week program. More information of the youth mentor family approach may be read in Haddock et al. (2013).

Campus Connections takes place four nights per week (Monday – Thursday) during a regular academic semester (12 weeks), with each mentee assigned to one night. Approximately twenty-eight mentees were assigned to each night. Each semester, two of the nights were randomly assigned to the traditional dyadic mentoring condition, and two of the nights were randomly assigned to the mentor family condition. Only the control group was included for my thesis. This decision was made because the control group more accurately reflects most group mentoring programs. It is the hope that my thesis will be more generalizable to other group mentoring programs.

Youth (mentees) were referred to the CC program through several community agencies including the local school district, juvenile justice system, Department of Human Services, and various youth and family agencies. Upon receipt of the referral, trained CC staff contacted potential participants and conducted intake appointments to determine program eligibility and obtain youth assent and parental consent. Study inclusion criteria included: Youth aged 11-18 years of age, reported experience of at least one risk factor from the risk screening tool (Herrera, Dubois, & Grossman, 2013), and available to participate during the CC operating hours. Participants could not have participated in previous CC sessions to be eligible for this study.

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Measures

In the proposed investigation, data were drawn from multiple time-points. If eligible and willing to participate in the CC program, mentees were provided 6 surveys during their time at

CC. Surveys were provided at intake (Baseline; wave 0), week 1 (wave 1), week 3 (wave 2), week 6 (wave 3), week 9 (wave 4), and week 11 (wave 5) of the 12-week program. Surveys were completed using Qualtrics, a web-based survey software. The Institutional Review Board at Colorado State University approved all the described procedures.

Demographics

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All youth demographics were collected at program intake (wave 0). Youth reported on their own primary demographic characteristics including age (11-18) and race/ethnicity. Parents reported child SES demographics (Such as household income) and youth social emotional skills.

Belongingness

Campus Connection mentees responded to a five-item scale that inquired about their sense of belongingness at CC via an adaption of the belonginess measure created by Youth Development strategies, Inc. This measure was distributed at wave 1-5. At wave 1, youth participants were asked about their expectations to belong (i.e. “I feel like I will belong at Campus Connections”). For all other weeks, youth were asked about their present feelings of belongingness in the program (i.e. “I belong at Campus Connections”). Cronbach’s alpha was adequate at all five time points (α = .88 - .92).

Social Network

Youth were asked to indicate their relationships with other youth, mentors, and staff in the program during wave 1-5 of the program. Youth were shown pictures of other youth, mentors, and program staff within the program and were asked to select all that they had a relationship with. Youth were then asked to rate the relationship with each selected individual on a scale of 1-10.

~~1.)~~ From these data the following individual network statistics will be calculated: *Inbound connections* and *outbound connections*. Inbound connections are connections that someone else chose towards the individual of interest (The arrow is point into the ego of interest). Outbound connections are those that the individual of interest is choosing towards another individual (The arrow is pointing out of the ego). We are also interested in the combination of inbound and outbound connections.

Analysis Plan

The social network component will be split into three sub-analyses of youth inbound, outbound, and all (inbound + outbound) connections formed throughout the course of the program. Additionally, those sub analyses will be split further into 1.) connections specifically with other youth, 2.) connections with other mentors in the program and 3.) connections with all youth, mentors, and staff in the program. This will make for a total of nine analyses within the social network component of the study. Each subcomponent is necessary to understand which relationships matter most in a group mentorship intervention such as CC.

All models will control for age, sex, ethnicity, SES (parent report) and youth social emotional skills (parent report). Furthermore, analyses will only be conducted on the control group of the study. The decision to utilize only the control group was based on the control groups' ability to generalize better to other group mentorship programs that incorporate a dyadic mentorship approach. Youth were randomly assigned to the control condition.

Analysis 1: Latent Growth Curve Model

Latent growth modeling using Mplus Version 8 (Muthén & Muthén, 1998) will be implemented to model the growth of belongingness and the youth social network (inbound, outbound, and all connections) across the five timepoints of CC. Latent growth modeling has

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been used in previous studies to analyze behavior changes in adolescent populations (Barnes, Reifman, Farrell, & Dintcheff, 2000). More specifically, a growth model for two parallel processes for continuous outcomes will be implememnted. This model will test the growth trajectory of the belongingness measure and the social network measures at the same time. My conceptual model can be seen in figure 3. I hypothesize the correlation of the growth trajectory between the social network measures and the belongingness measures will be high.

The latent growth curve model will analyze the changes in the social network from wave 1 to wave 5 of the study. The number of inbound, outbound, and all connections will be used as the time varying component across timepoint. Concurrently, the model will analyze the growth across waves 1-5 of the belongingness measure. At each time point, the belongingness and connections will be correlated with one another. With this model, I aim to answer the research questions: Does an individual's social network correlate directly with their social network? Additionally, what is the strongest indicator of belongingness in the program? Is it inbound connections, outbound connections, or the combination of the two?.

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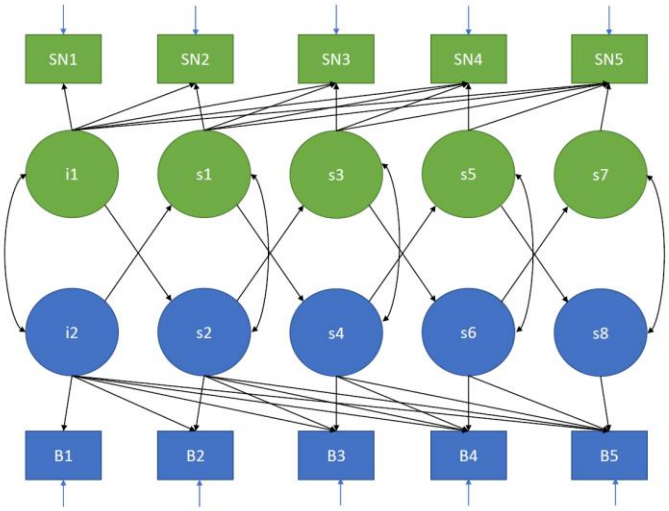

Figure 3. Anticipated growth trajectory model for trajectory analysis plan. Straight arrows represent regression lines, curved arrows represent correlations and blue arrows represent error.

~~The growth curve models will be used to analyze the changes of the belongingness scale and the social network across the five CC timepoints. Timepoint one will be used as a baseline measure and used to model the fixed and random intercept of the growth curve model. Next, the changes in the belongingness measure and social network scale across the rest of the time points will be analyzed (i.e. the slopes).~~

~~The social network component will be split into three sub-analyses of youth inbound, outbound, and all (inbound + outbound) connections formed throughout the course of the program. Additionally, those sub analyses will be split further into 1.) connections specifically with other youth, 2.) connections with other mentors in the program and 3.) connections with all~~

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~~youth, mentors, and staff in the program. This will make for a total of nine analyses within the social network component of the study. Each subcomponent is necessary to understand which relationships matter most in a group mentorship intervention such as CC.~~

~~All models will control for age, sex, ethnicity, SES (parent report) and youth social emotional skills (parent report). Furthermore, analyses will only be conducted on the control group of the study. The decision to utilize only the control group was based on the control groups' ability to generalize better to other group mentorship programs that incorporate a dyadic mentorship approach. Youth were randomly assigned to the control condition.~~

~~After the two growth models are estimated, a correlation between each social network component growth model and belongingness growth model will be run to assess if the growth trajectory is similar. By correlating the belongingness growth model with each subcomponent of the social network growth models, we will be able to understand which relationships are most important in building a sense of belongingness in the program.~~

Analysis 2: Mediation Model

Next, I propose a mediation model with belongingness as a mediator between the number of connections (inbound, outbound, and inbound/outbound) and a developmental outcome (i.e. academic aspirations, delinquency). The proposed model is shown in Figure 1. I hypothesize that the more connections a youth participant has, the higher their sense of belonging will be. This higher sense of belonging will be associated with improved developmental outcomes. To calculate this, I will first analyze the direct effect of social connections on a developmental outcome (i.e. delinquency, academic aspirations; the c path). Next, I will regress belongingness on the social connections (a path) to obtain the coefficients. Then, I will regress the developmental outcomes (i.e. delinquency, academic aspirations; the b path). Then I will obtain

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the bootstrapped indirect effect of the path from social connections to the developmental outcome (c' path). With this model, I aim to understand the impact belongingness has on developmental outcomes (i.e., academic performance, depression, anger, and delinquent behaviors).

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