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

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Thesis Proposal

# ABSTRACT

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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 program 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 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. In this setting, it is important to consider what types of bonds are most important for treatment effects to be realized. That is, 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, 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 (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.

Despite the fact that adolescence is a period full of risk, most young people successfully navigate this developmental period and successfully transition to adulthood. However, 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 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). Given these considerations, preventive efforts are needed to minimize behavioral difficulties amongst at-risk adolescents.

## **Mentorship Interventions**

One promising intervention to promote positive adolescent outcomes is mentorship. Mentorship intervention programs provide adolescents with a role model straight from the community which they both reside. Mentors are encouraged to enhance coping strategies, 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). 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 negative or small on academic achievement, attendance, attitude, and negative behavior (i.e., school misconduct, drug use).

A group-based approach to mentorship may increase efficacy. Group-based mentoring allows programs to serve a larger number of youths at once. Promotions in resiliency and prosocial attitudes have been seen in group mentorship programs (Kuperminc, Chan, Hale, Joseph, & Delbasso, 2019; Weiler et al., 2015).

### *Deviancy Training in Group Mentorship Interventions*

However, group mentorship faces challenges when systematically grouping at-risk youth. One such facet that promotes negative and iatrogenic effects in group mentorship programs is deviancy training (Dishion, Eddy, Haas, Li, & Spracklen, 1997). Deviancy training is the process in which deviant youth dyads have a tendency to respond positively to rule breaking behavior (Poulin, Dishion, & Haas, 1999). Unfortunately, at-risk youth in group-based mentorship programs are at risk to learn negative behaviors from each other as a result of deviancy training (Dishion & Tipsord, 2011). Friendship networks, formed during youth group interventions, are often a root cause of deviancy training (Dishion & Tipsord, 2011; Poulin et al., 1999). Group-based mentorship interventions need to be aware of such consequences.

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

## **Belongingness**

An important aspect of any community program, such as a group 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). A longitudinal analysis by Choenarom and colleagues (2005) showed that low levels of belonging are directly associated with higher levels of depression and anxiety among depressed adults. Furthermore, a sense of belonging has a negative correlation with stress and depression in the general population (Hagerty, Lynch-Sauer, Patusky, Bouwsema, & Collier, 1992).

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). Moreover, Knifsend and colleagues (2018) found that the link between participation in extracurricular activities and formed friendships was mediated by feelings of belongingness in the extracurricular activity. A group-based intervention, such as Campus Connections, serves as an extracurricular activity. The youth that participate in Campus Connections may benefit greatly from enhanced feelings of belongingness.

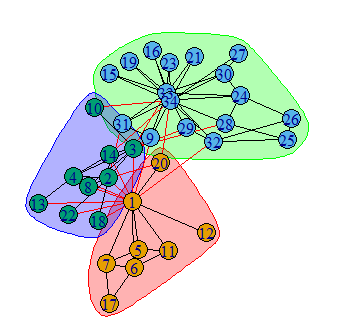
Prosocial bonds between youth are theoretically and empirically implicated in the development of delinquent behavior (Hirschi, 2017), which may characterize the behavior of youth who participate in mentorship interventions. As such, it is important to examine both youth’s feeling of belongingness and the social bonds they form while participating in a social program focused on building positive friendships with peers. Measuring belongingness in an intervention program is clearly an important part of understanding the true effect of such programs.

## **Social Network Analysis (SNA)**

Understanding what contributes to the development of deep relationships, 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 apply a novel SNA approach. I aim to incorporate the social network to further evaluate the effectiveness of a mentorship intervention. A social network approach will help to understand how an adolescent in a group-based intervention program can feel an enhanced sense of belonging. 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. In this section, I describe SNA in greater detail and how this thesis may benefit from a social network approach.

### *Defining Social Networks and SNA*

A social network is defined as a set of relationships between people and how they are mapped within a social structure. Every network consists of a set of actors with defining characteristics (nodes) and lines to represent the connection between them (known as ties or edges). A node is a person with defining characteristics to be analyzed within a network of other nodes with similar, or differing, characteristics (Luke, 2015). Social network analysis quantitatively measures the connection of nodes through edges by counting the number of relationships formed between each node and the probability of a relationship being formed between the nodes (Kadushin, 2012). Nodes may have several attributes such as, but not limited to, personality characteristics, gender, and age. The connection of these nodes through edges help understand how many connections a node may possess and from where those connections come. Social networks can also be viewed from an ecological standpoint to identify clusters of nodes and the commonalities between them such as family members, friends, and acquaintances (see Leskovec & Mcauley (2012) for an example of clustered networks). A visual display of nodes with attributes, edges, and clustering effects can be seen in *Figure 1*.



*Figure 1.* A social network from the *Zachary’s karate club network* (Gfeller, 2007). This network displays a university karate class’ connections and the clustering between them. The nodes (circles) have differing colors to represent attributes about the actor displayed. The edges (lines) show the connections between these nodes with certain attributes. Furthermore, the edges may be colored to characterize an attribute of the connection. Lastly, the surrounding colors identify how nodes are clustered into groups.

To study the organization of these nodes and edges that make up a social network, I will use SNA, which helps to define and measure the connections among people, organizations, and/or other individual units (T. W. Valente, 2010). More specifically, 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).

### *Social Network Analysis in Psychological Research*

Psychological research often relies on self-report surveys to answer research questions. In response, social network survey methodologies have been created. Survey research with a social network component consists of questionnaires that ask about relationships among a specified target group (Serrat, 2017). Social network survey questionnaire data is otherwise known as egocentric data, in which the actor is responsible for identifying their own network (Mccarty, Bernard, Killworth, Shelley, & Johnsen, 1997). These questionnaires require careful thought. There are two common approaches to collecting social network data in survey research:

1. *Social Cognitive Mapping/Roster:* Originally developed by Cairns, Perrin, & Cairns (1985), this method shows survey responders a list of names of individuals within the network. Respondents are requested to select all others that they have a relationship with. Roster methods require the use of a stem question such as, “To whom do you report to at work?” or “Please select individuals you have a friendship with…”.
2. *Name Generator/Nomination method:* This method allows participants to name any one or several individuals within a network. The names that may be generated are arbitrary and limitless. A common prompt a participant may see is, “Please indicate five individuals that you would seek advice from within your office…”.

Both methodologies have pros and cons and are particularly notorious for creating enormous datasets that are hard to sift through without a systematic and methodical approach. Roster methodology requires high participation to produce valid data (Wasserman & Faust, 1994). Additionally, a roster methodology may only be incorporated when all sets of potential connections are known (Butts, 2008). On the other hand, studies utilizing nomination methods have shown that subjects are likely to produce false negatives due to forgetting and/or fatigue (Butts, 2008). Errors especially occur in instances where the ego (an individual node in the network) has many connections (Brewer, 2000).

Despite such drawbacks, these collection methods for social network analysis have been shown to have a useful place in community interventions. For example, Klovdahl (1985) created a social network intervention to identify and prevent HIV outbreaks within a men who have sex with men (MSM) population. Further, DeLay and colleagues (2016) used adolescent friendship networks to evaluate the Family Check-up model within adolescent populations, finding that controlling friend selection may lead to less deviant friend groups. And, Kornienko, Dishion, & Ha (2018) used social network interventions to reduce antisocial and violent behaviors within an adolescent population. Finally, experimental research by Valente (2003) found differences in tobacco intervention programs that identified group leaders in network analysis, which carries important public health implications by reducing tobacco use. In summary, measurement and analysis of social networks can directly improve existing interventions and inform understanding.

## **Putting it Together: Adolescent Mentorship Interventions, Belongingness and SNA**

Adolescents are often a population of interest in social network research. They encompass a unique population that experience a large influence from peers. For example, years of research have established the influence of peer networks on several health behaviors such as rates of cigarette smoking (Ennett et al., 1993; Ennet et al., 2008). Additionally, recent studies have shown that adolescent alcohol consumption is directly mediated by the peer groups with which youth are associated (Quiroga et al., 2018).

The dyadic nature of the mentor-mentee relationship is highly conducive to employing social network approaches in mentorship research. Hamilton & Hamilton (1992) and Rhodes (2005) proposed that the addition of a mentor in an adolescent’s life increases social capital by linking youth to other mentor networks or creating connections to entirely new networks.

By analyzing the social network in a mentorship program and incorporating the sense of belongingness, I can gain a comprehensive understanding of the adolescent group mentorship program experience. Understanding the core concepts will help to understand areas in which deviancy training may arise and moderate the relationship between a mentorship intervention and desired outcomes. Incorporating adolescent belongingness as a prime mediator will add another dimension and understanding to the project. Belongingness has been shown to enhance program effects for youth (Marsh & Evans, 2009). Therefore, by implementing strategies to see what enhances belonging in a group mentorship program we can make sense of what ties (i.e. mentee- mentee, mentor-mentee) enhance an adolescent’s belongingness in the program overall.

## **Proposal**

This study aims to examine the role of adolescent belongingness and social network principles in an adolescent mentorship program. The reasoning for this approach is to understand which relationships matter most in an adolescent mentorship program. I intend to find out if the relationships formed between other youth, mentors, or all individuals in the program are of the most importance. I hypothesize that a youth’s social network and score on a belongingness measure will grow at a similar trajectory during a 12-week mentorship intervention. However, which relationships are best at characterizing the similar growth trajectories between the social network and belongingness scale will be exploratory. Furthermore, I 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) provide the best understanding of adolescent outcomes (i.e. academic performance).

# CHAPTER II: METHODS

## **Data**

Data for this project will be 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.

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 typically occurred four nights per week (Monday – Thursday) during a regular academic semester, with each mentee assigned to one night. Twenty-eight mentees are assigned to each night. Mentees were randomly assigned to either the experimental mentor family condition or the treatment-as-usual dyadic pairing mentorship condition. 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.

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.

## **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 5 surveys during their time at CC. Surveys were provided at week 1 (Baseline; 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.

### *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 all five waves. 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”). All five time points showed stable and great internal consistency (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 on a scale of 1-10 with the other youth in the program.

From these data I was able to extract important information regarding two kinds of relationships:

1. **Inbound relationships:** A point in which an individual in the program reported being in a relationship with the youth answering the survey.
2. **Outbound relationships:** A point in which the youth answering the survey indicated a relationship with another individual in the program.

## **Analysis Plan**

Latent growth modeling using Mplus Version 8 (Muthén & Muthén, 1998) will be implemented to model the growth of belongingness and the youth social network across the five timepoints of CC. Latent growth modeling has been used in previous studies to analyze behavior changes in adolescent populations (Barnes, Reifman, Farrell, & Dintcheff, 2000). 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 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.

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