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EMOTIONAL INTELLIGENCE IN
ORGANIZATIONAL SOCIAL NETWORKS

by

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ABSTRACT

This study examined the role of emotional intelligence in relationships. Drawing on the notion that individuals who are high on emotional intelligence should have more social ties to others and stronger relationships within these ties, this study used social network analysis to specifically examine the extent to which emotional intelligence is positively related to social network centrality. I hypothesized that emotional intelligence would be positively related to centrality in four networks: advice, friendship, support, and positive affect presence. The hypotheses were not supported in this study, in spite of this, the incremental validity suggest a relationship between emotional intelligence and network centrality that may show up in future research.

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INTRODUCTION

Background of the Study

Emotional Intelligence (EI) has been defined by Mayer and Salovey's (1997) four-branch model, as a representation an individual's ability to perceive, understand, use, and regulate emotion. Intuitively, emotional intelligence is important in the workplace as employees need to be able to control and manage their emotions at work and display appropriate emotions to supervisors, coworkers, and/or customers. In prior research, emotional intelligence has been attributed to the facilitation of more successful and positive relationships with others (Schutte, et al., 2001; Langhorn, 2004; Cote, 2014), and most theories of emotional intelligence propose that people who have higher emotional intelligence can develop and maintain functional relationships in the workplace more effectively than those who are low on emotional intelligence.

Unfortunately, to date, no empirical research has evaluated this fundamental notion (i.e., whether emotional intelligence leads to stronger work relationships) using social network analysis, despite the fact that many consulting firms currently sell emotional intelligence products that are implicitly based on this idea (i.e., emotional intelligence leads to more pleasant interpersonal interactions). This raises the question, are individuals who are higher in emotional intelligence better at developing and maintaining relationships at work?

Goals of the Study

The goal of this study was to investigate the extent to which emotional intelligence is related to the development and maintenance of work relationships by examining the relationship between emotional intelligence and employee social network centrality. Network centrality shows "the prominence or importance of the actors in a social network" (Wasserman & Faust, 1994, p. 170) and it is expected that individuals who have high emotional intelligence will have

greater network centrality in their organizational networks, especially in advice networks, friendship networks, and support networks. I also proposed that emotional intelligence is related to one's positive affect presence, or the extent to which an individual engenders positive feelings in others (Eisenkraft & Elfenbein, 2010).

When emotional intelligence was first discovered there was a great deal of excitement, and this excitement was based on the notion that people who more emotional intelligent are better at establishing and maintaining relationships (Boyatzis, Goleman, & Rhee, 2000). This research provides evidence to evaluate this notion as a central tenet of emotional intelligence theory. If the hypotheses are found to be true, and emotional intelligence is related to social network centrality, then emotional intelligence can be further researched for the extent to which it can be trained in both employees and/or leaders (i.e., Can we train employees on emotional intelligence to increase their network centrality and thereby enhance their functional role as a leader?).

Knowledge about emotional intelligence and social networks in organizations has implications for training individuals to be more emotionally intelligent when they are expected to be in highly central roles in the organization (i.e., training leaders to be more emotionally intelligent might increase the strength of their ties to their followers). This type of research could be extended in the future by using behavioral tracker/monitors, where employees wear devices that record their physical location, meetings with others, their voice amplitude, etc., similar to what some organizations such as IBM are already doing (Tian, et al, 2008). These trackers would be used to assess the extent to which individuals who are more/less emotionally intelligent engage in certain behaviors (e.g. more meetings with others who are high on centrality, more lunch meetings with more individuals, etc.) and to give additional behavioral evidence to the

theory of emotional intelligence, as important to interpersonal relationships. However, before work on behavioral ties and their practical role in assessing leadership behaviors as an indicator of emotional intelligence can begin, the fundamental relationship between emotional intelligence and work relationships must be examined, which is the focus of the current paper.

LITERATURE REVIEW

Defining Emotional Intelligence

Mayer and Salovey first conceptualized emotional intelligence (EI) in 1990, and it was soon after popularized by Goleman's (1995) book titled *Emotional Intelligence: Why it Can Matter More than IQ*. The definition that Salovey and Mayer began with in 1990 classified emotional intelligence as four mental abilities including the appraisal and expression of emotion, the use of emotion to facilitate thought, the ability to understand emotion, and the ability to regulate emotion. Goleman (1995) expanded the conceptualization of emotional intelligence by proposing five domains of EI: knowing one's own emotions, managing one's own emotions, motivating oneself, recognizing emotions in others, and properly handling relationships. A few years later in 1998, Goleman took these five domains and separated them into twenty-five emotional competencies. Since then, the construct has been praised (Daus, 2006) and criticized (Locke, 2005) partially because of the broad range of conceptualizations that have been used to define it, which created a need for emotional intelligence to be specified further. Once emotional intelligence had seen a large range of definitions, and more research was gathered, Mayer, Salovey, and Caruso (2000) revised the definition and ideas of EI, including formally distinguishing trait-based (mixed) emotional intelligence from ability-based emotional intelligence.

The trait-based or the mixed model represents a combination of emotion, personality, and intelligence, and has been criticized as being too vague and for involving elements that are unrelated to emotion (Landy, 2005; Locke, 2005; Mayer, Salovey, & Caruso, 2008). Although mixed model emotional intelligence lacked a strong theoretical basis, it was still able to gain a

following in popular press and practice. Petrides and Furnham (2000) explained how trait-based emotional intelligence is embedded in personality and acknowledged that the trait-based approach largely overlapped with personality variables. They later went on to more clearly define trait-based emotional intelligence as “emotion-related self-perceptions and dispositions located at the lower levels of personality hierarchies” (Petrides, Perez-Gonzalez, & Furnham, 2007, p. 26). A meta-analysis of trait-based/mixed emotional intelligence by Joseph, Jin, Newman, and O’Boyle (2015) found that mixed emotional intelligence does overlap greatly with conscientiousness, extraversion, general self-efficacy, self-rated performance, ability-based emotional intelligence, emotional stability, and cognitive ability, suggesting that mixed-model emotional intelligence is “old wine in new bottles” as critics suspected (Landy, 2005; Locke, 2005).

In contrast, ability-based emotional intelligence, also known as the ability model of emotional intelligence, is based on both emotions and cognitive systems. Mayer, Salovey, and Caruso (2000) explain it as the ability to recognize, process, manage, and handle emotions in oneself and the people around them. Many researchers have suggested that the ability-based approach has a stronger theoretical development and greater construct validity than the mixed approach (Mayer, Salovey, & Caruso, 2008; Daus & Ashkanasy, 2005). These studies further explained that ability-based EI is more focused and consistent with idea of emotional intelligence, rather than overlapping with other constructs, as is the case with trait-based/mixed emotional intelligence. Overall, ability-based emotional intelligence has been found to be more of an intelligence than trait-based/mixed emotional intelligence because factor analytic evidence suggests it can be included in traditional models of intelligence (MacCann, Joseph, Newman, & Roberts, 2014). Because the ability-based model has received more theoretical and empirical

support for its construct validity (Daus & Ashkanasy, 2005; Daus, 2006; Mayer, Salovey & Caruso, 2008), this study used the ability-based emotional intelligence model to relate emotional intelligence to employee centrality in workplace social networks.

Emotional Intelligence in the Workplace

Having the ability to understand and react to others' emotions could benefit people in the workplace. Joseph and Newman (2010) found that ability-based emotional intelligence is positively related to job performance (especially in jobs with high emotional labor that require social interaction). Beyond job performance, higher emotional intelligence is linked to a better work/life balance, especially in jobs with high emotional labor demands, and assisting employees in creating positive work-related attitudes (Sjoberg, Littorin, & Engleber, 2005; Carmeli, 2003). Carmeli (2003) researched the relationship between attitudes and emotional intelligence and determined that managers who are emotionally intelligent will become more attached to their organizations, and thus more committed to their career. Beyond this Carmeli (2003) found that employees who are highly emotional intelligent often are more satisfied with their work.

Emotional intelligence has been shown to predict a wide range of outcomes in the workplace, from job satisfaction to turnover, and stress tolerance (Bar-On, 2000). However, despite substantial work on emotional intelligence, job performance and job attitudes, little work relating emotional intelligence to workplace relationships has been done. Emotional intelligence has been a widely popular tool for consultants and practitioners for over two decades, and this popularity has been built on the premise that individuals who have high emotional intelligence are better at developing and maintaining workplace relationships. For example, Abraham (2000) researched job control and emotional intelligence and found that the "social skills component of emotional intelligence led to the building of strong networks with the work group and possibly

with supervisor” (p. 181). From these results Abraham (2000) believed that employees who are higher in emotional intelligence could potentially see their relationship with the organization as similar to a relationship with another person. Some research has been done indicating that people with higher emotion regulation (one dimension of the ability-based model of emotional intelligence) have higher quality social interactions, and are viewed more favorably (Lopes et al., 2005). This provides further evidence to believe that emotional intelligence is related to the development of relationships, and should be related to centralization in one’s social networks.

Social Networks

Social network analysis is “a distinct research perspective within the social and behavioral sciences ... based on an assumption of the importance of relationships among interacting units” (Wasserman & Faust, 1994, p. 4). Social network analysis is beneficial in gathering information regarding social interactions and relationships to study the connections in a network (Scott, 2013). Using relational data, social network analysis can easily be incorporated into organizations to analyze the relational ties among employees. These ties can include communication ties (who speaks to whom), advice ties (who provides whom job-related information), friendship ties, and even conflict ties. Moreover, the study of social networks are important in organizations because these networks affect how employees learn and share information (Borgatti & Cross, 2003).

Social network analysis can examine many different aspects of network formation such as centrality, density, directional relationships, meaning of positions, and much more. Specifically, centrality is a measure within social network analysis that describes the importance of that person in the social environment (Wasserman & Faust, 1994). This idea of centrality is often called centralization or global centrality and it examines the network as a whole, but the

term 'centrality' is actually the idea of point centrality which is the relevance of important points (Scott, 2013). Within point-centrality there is an important distinction between in-degree and out-degree centrality. Both types of centrality are used to look at the importance of an actor in their network, and in-degree centrality represents the links incoming from other people in the network (Borgatti, Everett, & Freeman, 2002; Lee, 2010), whereas out-degree centrality is the opposite, representing the number of ties the individual self-reported as providing to others. In-degree centrality can suggest an actor's popularity or activity in their network, which is important in organizations (Freeman, 1979; Wasserman & Faust, 1994, Burkhardt & Brass, 1990, Klein, et al., 2004, Fang, et al. 2015), whereas out-degree centrality represents the extent to which an employee is receiving resources from others in the network (e.g., in-degree advice centrality represents how much advice an individual is giving to others, whereas out-degree advice centrality represents how much advice an individual is receiving from others).

Organizational research using network analysis has shown relationships between network centrality and administrative roles (Ibarra & Andrews, 1993), job performance (Sparrow, Liden, Wayne & Kraimer, 2001), perceived status in organizations (Westaby, Pfaff & Redding, 2014), and there is a correlation to aspects of commitment and competence (Cowardin-Lee & Soyalp, 2011).

Although in-degree and out-degree centrality are important indicators of relationships in organizations, they are asymmetrical ties, and some researchers believe that these one-way ties can be unstable, while reciprocated ties may be more stable indicators of relational bonds (Hanneman & Riddle, 2005). Although similar, reciprocal ties and symmetric ties are different. Symmetrical ties are when both person A and person B respond in the same way, meaning they both agree on interacting or not interacting with one another. Stated differently, reciprocal ties

are when both people agree on interacting with one another, meaning that A is matched to B, and B is matched to A (Borgatti, Everett, & Johnson, 2013). In the current paper, in- and out-degree centrality and reciprocal ties were examined because it assisted in determining whether emotional intelligence is more strongly related to asymmetric ties or reciprocal ties. Although, it is expected that individuals who are high on emotional intelligence have high in-degree centrality (i.e., others report receiving advice, support, friendship, and positive affect from these individuals), which is the primary focus of this paper, it may also be the case that these individuals also report receiving advice, support, friendship, and positive affect from others more often, which may create strong reciprocal ties. Below, these ideas are clarified in more detail for each type of centrality investigated in the current paper.

Advice Network Centrality

In organizational research and management consulting, the premise behind using social network analysis is to help organizations understand the “knowledge and capabilities distributed across its [employees]” (Borgatti, Mehra, Brass, Labianca, 2009, p. 893). This transfer of knowledge and capabilities could be examined by looking at advice, communication, support, or friendships.

Advice has not been directly correlated with emotional intelligence in previous work, but this does not mean the two are unrelated. For example, Weaving, Orgeta, Orrell and Petrides’ (2014) findings suggested that a person with higher emotional intelligence can correctly predict anxiety in another person, this could mean that people who have higher emotional intelligence would see the anxiety as a signal, better than those who are low in EI, and sense that advice may be needed.

Emotion regulation, an aspect of emotional intelligence, allows people to appropriately assess a threat and then adapt to that situation in a functional way (Cartwright and Cooper, 1997). From this, other researchers have discovered direct relationships between emotional intelligence and being able to engage in better conflict resolutions and more effective conflict management (Schuttle & Loi, 2014; Cartwright & Pappas, 2008). With this information it would be reasonable to believe that people who have higher emotional intelligence would be better at assessing, and then dealing with interpersonal problem situations, perhaps by being more effective at giving and receiving advice from others.

In 2000, George predicted the first relationship between trust and EI. For a person to seek out advice from a person there need to be a level of trust, thus if employees in a workplace are going to take advice from a person they need to trust them. From George's (2000) theory we can presume that people who have a higher emotional intelligence have more people around them who trust them, and then we can assume that those people would also have more people who would seek their advice.

Advice network centrality has been linked to some aspects of EI; for example, Zhang Zheng, and Wei found that helping behavior "has a significant influence on advice network centrality" (2009, p. 207). They were able to show that the employees in an organization who showed more altruistic behaviors were significantly more centralized in the advice network, meaning that other employees sought them out. This helping behavior, which can also be known as organization citizenship behavior (OCB) has been significantly related to a person's emotional intelligence (Carmeli & Josman, 2006; Turnipseed & Vandewaa, 2012). With these two constructs being linked it is a fair assumption that if a person has higher emotional intelligence

(and would general exhibit more helping behavior) he/she would be more centralized in the organization's advice network.

It is important to note that emotional intelligence is proposed to relate to giving and getting advice from others via emotion regulation and correctly assessing anxiety in people to give needed advice to others. This research supports the idea that those people with higher emotional intelligence would be more likely to give and seek out advice from other people, thus they would be more centralized in both their in- and out-degree networks. With emotional intelligence being linked to OCB and the evidence for providing and receiving advice, then the advice relationship maybe symmetrical, in that those people who receive advice from someone, may actually give that person advice in other situations. This idea leads me to my first hypothesis.

Hypothesis 1: Emotional intelligence is positively related to advice network centrality (for in-degree centrality, out-degree centrality, and reciprocal tie centrality).

Friendship Centrality

Friendships in the workplace are rather common, and there has been a substantial amount of research on how workplace friendships have positive outcomes for the employees and the organization (Kuipers, 2009; Milam, 2012; Venkataramani, Labianca, & Grosser, 2013). This research is pivotal for organizations because researchers have found that workplace friendships aid in the sharing of experiences, behavior, and knowledge, which leads to better effectiveness (Lee, Yang, Wan, & Chen, 2010).

Although no research has been done to directly connect emotional intelligence to friendship network centrality, there is research that does lead to a potential connection between the two constructs. Emotional intelligence researchers have found that the social skills are

positively related to emotional intelligence (Schutte, et al., 2001), and researchers found that social skills are related to a more centralized position in the network (Wölfer, Bull, & Scheithauer, 2012), meaning that emotional intelligence could be related to friendship network centrality because it is a social skill.

When examining emotional intelligence, the different dimensions, and original definitions lead to a potential foundation for why emotional intelligence and friendships centrality would be related. When Salovey and Mayer originally defined emotional intelligence in 1990 they explained that emotional intelligence allows people to react appropriately after gauging others' affect; thus the emotionally intelligent person is perceived to be empathetic and emotionally genuine, which may increase trust perceptions, liking, and friendship. Dimensions of emotional intelligence have also been related to aspects of friendship. Specifically, there is a positive relationship between emotional management and initiating relationships (Yip & Martin, 2006), meaning that when initiating relationships, emotional management is important because the initiators must react appropriately and manage their own emotions to initiate and form a relationship. A study examining emotional intelligence, personality and friendships found that the dimensions' emotional perception, emotional utility, and emotional understanding were shown to positively predict friendship quality (Hong, Yan, Xiao-qing, & Ying, 2008). The reason for this could be that people with higher emotional perception may be able to detect others' emotions, react to them, and then offer some empathy with their emotional understanding ability, thus helping form and maintain friendships. Furthermore, Mayer, Roberts & Barsade in 2008 explained that emotional intelligence can predict the quality of relationships. This may be due to the general effect of emotional intelligence "lead[ing] to greater self-perception of social

competence and less use of destructive interpersonal strategies” (Mayer, Roberts, & Barsade, 2008, p. 525).

Supporting this, research also indicates that individuals with higher emotional intelligence are often “viewed more favorably by their peers ... and (had more) reciprocal friendship nominations.” (Lopes, Salovey, Cote, & Beers, 2005, p. 116). To further the belief that emotional intelligence is directly related to friendships, researchers determined that people scoring higher on emotional intelligence measures have better quality relationships (Mayer, Salovey, & Caruso, 2008), and have more positive social interactions (Lopes, et al., 2004). The reason for this may involve emotional regulation, which Salovey and Mayer (1990) proposed is a dimension of emotional intelligence including both the regulation of one’s own emotions and the regulation of others’ emotions. Thus, emotion regulation abilities may allow an individual to influence others’ mood in ways that should be less draining of resources than those who are lower on emotional intelligence (Joseph & Newman, 2010). With this in mind, it is expected that high emotionally intelligent people would have more regulatory resources and they should be able to handle more friendships at once.

Overall, research indicates that people who have higher emotional intelligence may have more friendships, and should therefore be more centralized in a friendship network. Within different networks there is an expectation for different types of relationships, and friendship is expected to be mutual (Wasserman & Faust, 1994). With this idea you would expect to find strong reciprocal ties for network centrality, so for a friendship network it is pertinent to look at incoming, outgoing and matching ties, thus my second hypothesis is:

Hypothesis 2: Emotional intelligence is positively related to friendship network centrality (for in-degree centrality, out-degree centrality, and reciprocal tie centrality).

Support Centrality

As mentioned earlier, people who have higher emotional intelligence have been thought to be more trusting and to have more and better quality friendships. With this premise, it is easy to expect that those people with higher emotional intelligence would also be providing more support in their workplace. Research has found that people who have the “ability to work well with others, as well as, overall judged social competence correlated (moderately) with emotional intelligence” (Mayer, Salovey, & Caruso, 2008, p. 511). Meaning there is a correlation between emotional intelligence, people working well with others and having social competence.

Langford, Bowsher, Maloney & Lillis (1997) theorized that social competence is related to social networks, social support, and social comparison because people who are embedding within a social network need social competence to assist with relationships and social support is an important part of this.

Specific dimensions of emotional intelligence have been related to the provision of social support. When studying emotional management, Lopes, et al. (2004) found that people with higher emotional management were more often reported to have provided more social support. George (2000, p. 1036) explained that “empathy, a contributor to emotional intelligence, is an important skill which enables people to provide useful social support and maintain positive interpersonal relationships (as cited in Batson, 1987; Kessler et al., 1985; Thoits, 1986)”. To further support this idea of a relationship between support and emotional intelligence, Mayer, Caruso, and Salovey (2000) found a negative correlation with unsupportive behavior, such as bullying, violence, and trouble behaviors, and emotional intelligence.

Prior research supports that there could be a relationship between emotional intelligence and providing support to others, which would support in-degree network centrality. Meaning that

those people with higher emotional intelligence should have many incoming network ties nominating them for providing support. The relationship should go the other way as well, in that people give support will also receive support. Although there is no research regarding emotional intelligence and seeking support, there is research that indicates people will receive support from someone after they have provided that person with support (Bowling, Beehr, & Swader, 2005). Along the lines of this, Fang, et al., (2015) wrote that social support was commonly received by people with many connections in their network (as cited in Baldwin, Bedell, & Johnson, 1997; Gibbons, 2004). Given this information, it is expected that not only would emotional intelligence be related to in-degree centrality, but it should be related to out-degree centrality. Most importantly, there should be a reciprocal relationship because people are apt to receive support from people they have already provided support to. This helped me develop my third hypothesis:

Hypothesis 3: Emotional intelligence is positively related to support network centrality (for in-degree centrality, out-degree centrality, and reciprocal tie centrality).

Positive Affect Presence Centrality

Eisenkraft and Elfenbein (2009) examined how an individual makes others feel, or one's trait affective presence, which they defined as one's consistent tendency to elicit the same emotions from other people. They found that the emotional states that people experience affect people around them causing the affective presence, and those people who have a positive affective presence elicit positive feelings in others.

A key part of the emotional intelligence definition involves the ability for a person to understand and appraise what others are feeling (Mayer, DiPaolo, & Salovey, 1993). This understanding of emotion is important because it allows an emotionally intelligent person to manage and regulate their own and others' emotions. Emotionally intelligent people should be

able to regulate their own emotions, to help enhance their mood (Salovey & Mayer, 1990), along with managing emotions in others to “moderate the negative emotions and enhancing pleasant ones” (Mayer & Salovey, 1998, p. 11). Along these lines you would expect that emotionally intelligent people can use their regulatory skills to create positive emotions and in turn have a stronger positive affect presence.

Emotional regulation, an aspect of emotional intelligence, is believed to help employees maintain higher levels of positive affect (Parke, Seo, Sherf, 2015), which may stimulate positive affect in others as well. For instance, research explains emotional contagion as a process where one person expressed emotions and another person will “catch” them. Which Bono and Ilies (2006) proposed may allow some leaders to positively influence their follower’s mood via their own positive mood. All this information combined leads to the possibility that people with higher emotional intelligence may create an environment that feels more positive to others.

This information led me to my final hypothesis, which is that emotional intelligence is positively related to centrality for creating/eliciting positive affect presence and perceiving a presence in organizational networks.

Hypothesis 4: Emotional intelligence is positively related to positive affect presence network centrality (in-degree centrality and out-degree centrality).

Incremental Validity

Emotional intelligence has been criticized by many authors, due to its overlap with personality (Van der Zee, Thijs, & Schakel, 2002; Schulte, Ree, & Carretta, 2004; and Daus & Ashkanasy, 2003). Researchers have examined the mixed-model of emotional intelligence and found that personality explained variance in performance beyond emotional intelligence (Van der Zee, Thijs, & Schakel, 2002). The ability-based model of emotional intelligence has a

stronger construct validity and researchers have found that although personality will show similar patterns, there is not as much of an overlap as there is with personality and the mixed-based model of emotional intelligence (Joseph & Newman, 2010). Due to these criticisms and concerns regarding the overlap of emotional intelligence with personality, the incremental validity of emotional intelligence predicting network centrality above and beyond personality was examined.

METHOD

Sample

A teaching and learning organization agreed to participate in this research study. The organization is responsible for assisting others in learning how to work with a university's online system, work to provide distance learners' access to education, further develop teaching and learning through data analysis, policies, instructional design, and strategic planning. The organization was made up of 86 part and full time employees with 9 different working teams at the time of data collection.

Surveys were distributed to all the employees that were employed at the time, the link to the survey was sent to each employees work e-mail for them to complete online, confidentiality was assured. Of the 86 employees, 51 completed the survey entirely, with a response rate of 59%. The respondents were from 9 different teams, there were 12 part-time employees (20%) and 49 full-time employees (80%), they had an average of 7.45 years working with the organization and ranged from 0 to 35 years. There were 32 female respondents and 28 male, all with a mean age of 40.16 years, with age ranging from 20-68 years old.

Measures

Social Networks

All current employees were asked to respond to four network questions. The items themselves were adaptive from other studies. The survey employed the roster method (Marsden, 1990) in which all employee names were listed on the survey and each participant evaluated their relationship with each other employee. Participants were asked how much they agree on a six-point Likert scale (0 = do not interact with this person, 1 = strongly agree to 5 = strongly disagree) with the following statements: "If I needed advice for a work-related problem, I would

see advice from this person,” (Bono & Anderson, 2005) “This person is a very good friend of mine,” (adapted from Ibarra, 1993) “This person is someone I know I can count on, who is dependable in times of crisis,” (adapted from Ibarra, 1993) and “One average, this person makes me feel happy” (adapted from Eisenkraft & Elfenbein, 2010).

Emotional Intelligence

Emotional intelligence was measured with two different emotional intelligence test the Situational Test of Emotional Management (STEM) and the Situational Test of Emotional Understanding (STEU) (MacCann & Robert, 2008). The STEM and STEU were developed by MacCann and Roberts in 2008 as an alternative assessment to the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), and they have both have moderate reliability (STEM $\alpha=.68$ and STEU $\alpha=.71$). The short form of the Situational Test of Emotional Management - Brief (STEM-B) (Allen, et al. 2015) and the short form the Situational Test of Emotional Understanding – Brief (STEU-B) (Allen et al. 2014) were used. The STEM-B has 18-items out of the full 44-items from the STEM, while still correlated with the original measure ($r=.86$) and maintained good reliability with ($\alpha=.84$). An example of a STEM-B item and response choices: “Surbhi starts a new job where he doesn’t know anyone and finds that no one is particularly friendly. What action would be the most effective for Surbhi?”; response options “(1) Have fun with his friends outside of work hours, (2) Concentrate on doing his work well at the new job, (3) Make an effort to talk to people and be friendly himself, (4) Leave the job and find one with a better environment”. Following Allen et al. (2015), the STEM-B was scored using the MacCann and Roberts (2008) scoring scheme representing the proportion of experts who selected each option as the best answer. The STEU-B has 19-items out of the 42-items from the STEU, with moderate reliability ($\alpha=.63$). An example of a STEU-B item with responses choices is: “Xavier

completes a difficult task on time and under budget. Xavier is most likely to feel? (a) Surprise (b) Pride (c) Relief (d) Hope (e) Joy”. The STEM-B was scored using dichotomous scoring and an alternative scoring scheme presented in MacCann and Roberts (2008), which correlated with the proportion scoring .97 and .99, respectively, suggesting the scoring scheme did not greatly affect the data. To calculate an emotional intelligence score, a mean score was calculated for each participant for their overall STEM-B, and STEU-B score. These scores were then standardized, and averaged to create a global emotional intelligence score.

Personality

For personality the ten-item measure of the Big Five was used called the Ten-Item Personality Inventory (TIPI), it has participants rate personality traits on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree) if they believe the ten-item personality traits describe them; these are traits such as extraverted; anxious; or calm. Gosling, Rentfrow, and Swann Jr. (2003) showed their TIPI converged well with other inventories ($r = .77$) and had a test-retest ($r = .72$).

Demographics

Demographics such as age, gender, full-time or part-time status, ethnicity, and organizational tenure was also collected.

Procedure

Employees were sent an e-mail containing a link to the survey, they choose to participate and their information was kept confidential. The survey was distributed to all employees at once, and should have taken approximately 30 minutes for them to complete. The employees were sent two reminders to encourage participation.

Analyses

Correlations were run to test the relationship between emotional intelligence and each of the four types of social network centrality. Centrality was operationalized in three different ways, including network in-degree centrality, out-degree centrality, and via reciprocal relationship ties. As described by Scott (2013), in-degree is the sum of scores across other individuals' reports about the focal participant (e.g., in-degree friendship centrality is the sum of responses indicating how many individuals have nominated the focal individual as a friend) and out-degree centrality is the sum of scores across the focal individual's report (e.g., out-degree friendship centrality is the sum of responses indicating how many individuals the focal individual has nominated as his/her friend). In-degree and out-degree centrality were calculated with valued data (i.e., the data was not dichotomized, but instead kept on a 0-5 scale). Reciprocal ties were coded as present if both the focal individual and the other individual nominated each other with a score of 4 or higher on a 0-5 scale (after the data was recoded so 4 and 5 represented agree, and strongly agree). Reciprocal tie centrality was subsequently calculated as the sum of the focal individual's reciprocal ties. In-degree, out-degree, and reciprocal tie centrality was calculated for each person for each network, meaning each participant had three centrality scores for each of the four networks.

To test incremental validity of emotional intelligence, a regression was run on the Big Five personality measures for each of the network centralities then emotional intelligence was added on to see if emotional intelligence explained significant variance over and above personality for network centrality.

RESULTS

Descriptive statistics and correlations among the study variables can be found in Table 1. As seen in the table, there are slight differences between the amount of ties people report; advice (mean=22.83, s. d.=11.30), friendship (mean=10.82, s.d.=5.33), support (mean=17.69, s.d.=8.10), and positive affect (mean=17.45, s.d.=6.71). This provides the idea that there are the most connections in the advice network, the least in the friendship network, and the relationships appear to be the strongest for positive affect presence.

The average age of employees was 40.16 years old, with an organizational tenure of 7.45 years. Most of the correlations between the demographics and the STEM-B, STEU-B, and global emotional intelligence were not significant. However, there was a weak correlation for gender and STEM-B ($r=-.31$, $p<.05$) and for age and STEM-B ($r=.34$, $p<.05$). Network centrality was significantly related to some demographics, mostly from tenure, part versus full time employees, and age.

To test each hypothesis, in-degree, out-degree and reciprocal tie centrality for each type of social network was correlated with emotional understanding, emotional management, and the global emotional intelligence score. Hypothesis 1 states that emotional intelligence will be positively related to advice network centrality. Table 1 shows that emotional intelligence is not significantly correlated with advice in-degree centrality ($r = .05$), out-degree centrality ($r = -.09$), and reciprocal tie centrality ($r = .01$).

According to Hypothesis 2, emotional intelligence is positively related to friendship network centrality. The results in Table 1 show that emotional intelligence is not significantly correlated with friendship in-degree centrality ($r = .14$), out-degree centrality ($r = -.10$), and reciprocal tie centrality ($r = .03$).

Hypothesis 3 reasons that emotional intelligence is positively related to support network centrality. The results presented in Table 1 show that emotional intelligence is not significantly correlated with support in-degree centrality ($r = .10$), out-degree centrality ($r = -.11$), and reciprocal tie centrality ($r = .10$).

The final hypothesis states that emotional intelligence is positively related to positive affect presence network centrality. Table 1 shows that emotional intelligence is not significantly correlated with positive affect presence in-degree centrality ($r = .17$), out-degree centrality ($r = -.17$), and reciprocal tie centrality ($r = .02$).

Table 1: Correlations

	N	MEAN	S.D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1: AGE	57	40.16	13.94																									
2: GENDER	60	1.47	0.50	-.20																								
3: RACE	60	3.05	0.77	.02	.20																							
4: TENURE	60	7.45	6.62	.50*	.07	-.20																						
5: PART/FULL	61	1.80	0.40	.52*	.01	.03	.40*																					
6: STEM-B	51	0.63	0.11	-.34*	-.31*	.14	.16	-.06																				
7: STEU-B	51	0.66	0.13	-.14	.10	.23	-.36*	-.04	.23																			
8: GLOBAL EI	51	0.00	0.78	.12	-.14	.24	-.13	-.06	.78*	.78*																		
9: EXTRAVERSION	51	4.61	0.95	-.02	-.17	-.14	.02	.14	-.15	-.27	-.27																	
10: AGREEABLENESS	51	4.41	0.88	.23	.09	-.10	.27	.29*	-.20	.36*	-.35*	.22																
11: CONSCIENTIOUSNESS	51	5.63	1.18	.25	-.22	-.14	.14	-.09	.21	-.07	.09	.04	-.08															
12: EMOTIONAL STABILITY	51	5.02	1.47	.27	-.19	-.03	-.13	-.13	.32*	.04	.23	.02	-.40*	-.56*														
13: OPENNESS	51	5.31	1.04	.12	-.01	-.08	.01	-.02	.13	.05	.11	-.03	-.05	.19	.21													
14: ADVICE IN	60	188.12	104.15	.25	-.15	-.09	.23	.39*	-.02	.10	.05	.13	.09	-.05	-.03	.06												
15: ADVICE OUT	86	131.24	44.98	.26	.05	-.04	.28*	.59*	-.09	-.05	-.09	.07	.17	-.22	-.06	-.26	.51*											
16: ADVICE RECP	86	10.19	18.84	.26	-.10	-.07	.28*	.43*	-.01	.02	.01	.21	.14	-.21	-.17	-.06	.79*	.63*										
17: FRIEND IN	61	136.26	104.03	.30*	-.22	-.05	.15	.25*	.02	.19	.14	.19	.14	.02	.12	-.11	.70*	.45*	.63*									
18: FRIEND OUT	86	96.65	27.20	.30*	-.08	-.11	.27*	.60*	-.07	-.09	-.10	.10	.25	-.16	-.04	-.16	.60*	.92*	.62*	.52*								
19: FRIEND RECP	86	3.74	5.30	.21	-.19	-.03	.15	.24	-.06	.01	-.03	.24	.35*	-.10	-.09	-.10	.57*	.44*	.69*	.85*	.54*							
20: SUPPORT IN	61	152.51	121.17	.23	-.16	-.05	.14	.24	.04	.12	.10	.05	.14	.06	.13	-.09	.66*	.50*	.61*	.77*	.52*	.62*						
21: SUPPORT OUT	86	108.17	33.35	.30*	-.07	-.08	.27*	.54*	-.03	-.14	-.11	.00	.11	-.12	.02	-.21	.50*	.89*	.55*	.46*	.89*	.42*	.46*					
22: SUPPORT RECP	86	7.00	8.80	.21	-.06	-.04	.15	.34*	.05	.10	.10	.07	.20	-.08	.00	-.13	.60*	.63*	.79*	.73*	.61*	.73*	.89*	.58*				
23: POST AFFECT IN	61	146.26	120.25	.25	-.18	-.04	.14	.21	.10	.17	.17	.09	.18	.03	.12	-.08	.65*	.43*	.57*	.85*	.49*	.69*	.95*	.39*	.81*			
24: POST AFFECT OUT	86	103.74	29.20	.23	-.01	-.09	.23	.58*	-.15	-.11	-.17	.08	.27	-.18	-.06	-.24	.52*	.92*	.55*	.47*	.97*	.51*	.48*	.90*	.59*	.45*		
25: POST AFFECT RECP	86	6.33	8.28	.25	-.16	-.03	.16	.25*	-.03	.06	.02	.30*	.36**	-.07	-.08	-.18	.54*	.46*	.73*	.73*	.53*	.84*	.78*	.41*	.82*	.85*	.49*	

Note. *p < .05

In addition to the correlation analyses, regressions were run to test the incremental validity of emotional intelligence above and beyond personality. Given previous criticisms of emotional intelligence as overlapping substantially with personality traits (Joseph & Newman, 2010; Landy, 2005; Murphy, 2006). The incremental validity results are presented in Tables 2 to 5. The results remained non-significant (i.e., emotional intelligence did not significantly predict network centrality above and beyond personality), however emotional intelligence did tend to exhibit a modest (although not significant) amount of incremental variance above and beyond personality that may be worth additional investigation with a larger sample size.

Table 2: Incremental Validity for Emotional Intelligence with Advice Centrality Over Big Five Personality

Variable	Personality			Personality and EI		
	In	Out	Recp.	In	Out	Recp.
Big Five Personality						
Extraversion	.12	.03	.20	.14	.02	.23
Agreeableness	.07	.23	.06	.10	.23	.09
Conscientiousness	-.07	-.30	-.18	-.07	-.30	-.18
Emotional Stability	.02	.25	-.04	.00	.25	-.06
Openness	.07	-.24	-.01	.06	-.24	-.02
Emotional Intelligence				.13	-.01	.13
R ²	.028	.153	.095	.041	.153	.110
Adjusted R ²	-.080	.059	-.005	-.090	.037	-.012
Change R ²				.013	.000	.015

Note. *p < .05 Standardized regression coefficients.

Table 3: Incremental Validity for Emotional Intelligence with Friend Centrality Over Big Five Personality

Variable	Personality			Personality and EI		
	In	Out	Recp.	In	Out	Recp.
Big Five Personality						
Extraversion	.14	.04	.17	.19	.04	.20
Agreeableness	.21	.32	.36*	.27	.32	.40*
Conscientiousness	-.11	-.26	-.16	-.11	-.26	-.15
Emotional Stability	.29	.26	.16	.26	.26	.14
Openness	-.13	-.15	-.08	-.15	-.15	-.09
Emotional Intelligence				.25	.00	.15
R ²	.100	.137	.174	.151	.137	.192
Adjusted R ²	.000	.041	.082	.036	.019	.082

Change R ²	.051	.000	.018
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Note. *p < .05 Standardized regression coefficients.

Table 4: Incremental Validity for Emotional Intelligence with Support Centrality Over Big Five Personality

Variable	Personality			Personality and EI		
	In	Out	Recp.	In	Out	Recp.
Big Five Personality						
Extraversion	-.01	-.04	.01	.03	-.06	.05
Agreeableness	.25	.20	.27	.29	.18	.32
Conscientiousness	-.07	-.22	-.16	-.06	-.22	-.16
Emotional Stability	.29	.27	.23	.27	.28	.21
Openness	-.12	-.21	-.13	-.14	-.21	-.15
Emotional Intelligence				.17	-.08	.21
R ²	.079	.097	.084	-.103	.103	.119
Adjusted R ²	-.023	-.003	-.014	-.019	-.020	-.001
Change R ²				.024	.006	.035

Note. *p < .05 Standardized regression coefficients.

Table 5: Incremental Validity for Emotional Intelligence with Post Affect Centrality Over Big Five Personality

Variable	Personality			Personality and EI		
	In	Out	Recp	In	Out	Recp
Big Five Personality						
Extraversion	.03	.00	.22	.09	-.01	.27
Agreeableness	.28	.35*	.36*	.35*	.33*	.43*
Conscientiousness	-.10	-.27	-.11	-.09	-.27	-.11
Emotional Stability	.31	.27	.17	.28	.28	.14
Openness	.12	-.23	.17	-.14	-.23	-.19
Emotional Intelligence				.28	.08	.24
R ²	.094	.181	.225	.157	.185	.273
Adjusted R ²	-.006	.089	.139	.042	.074	.174
Change R ²				.063	.004	.048

Note. *p < .05 Standardized regression coefficients.

In Figures 1-4, created by UCInet (Borgatti, Everett, & Freeman, 2002) each employee is shown with directed ties to represent each relationship. Each node (the square) has a color assigned to represent the work team, and has been sized to represent that respondents' global emotional intelligence score. The lines are colored to represent the value from the survey, green lines are the 'agree' and 'strongly agree', the yellow are 'neither agree nor disagree' and the red is

‘disagree’ and ‘strongly disagree’. Most of the networks look similar, most of the workers tend to interact with the same people in the workplace. From the photos, the advice network has the most positive ‘agree’ connections. The most interesting is the friendship network, although there are many different connects most of the connections are people ‘disagreeing’ to being friends with their co-workers rather than considering them a friend.

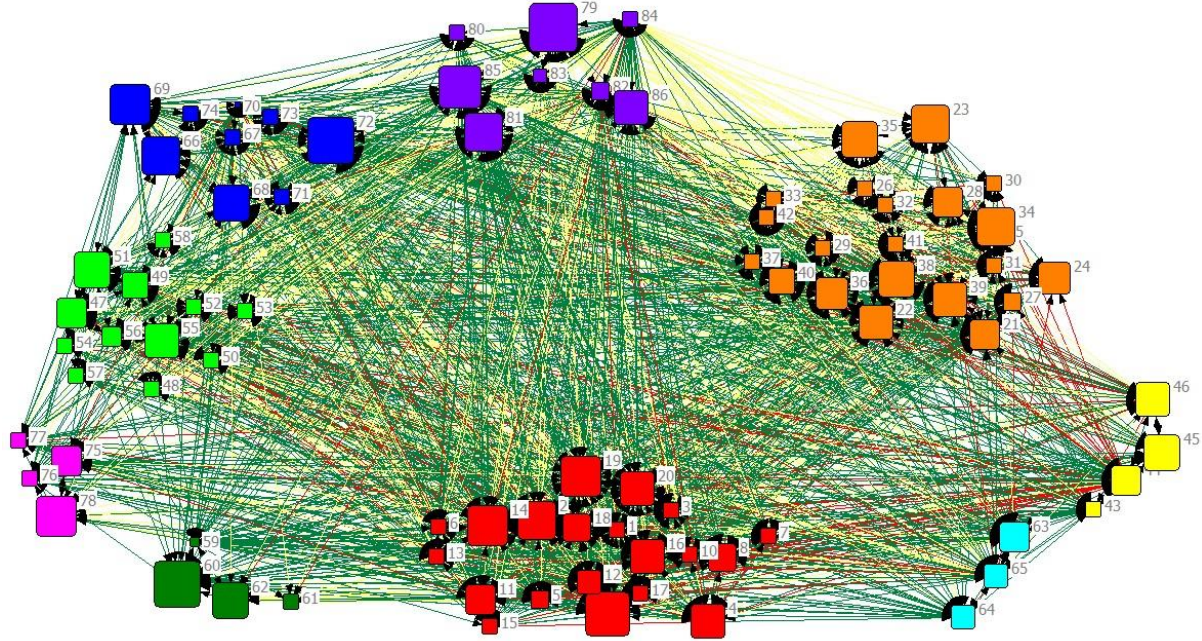


Figure 1: Advice Network

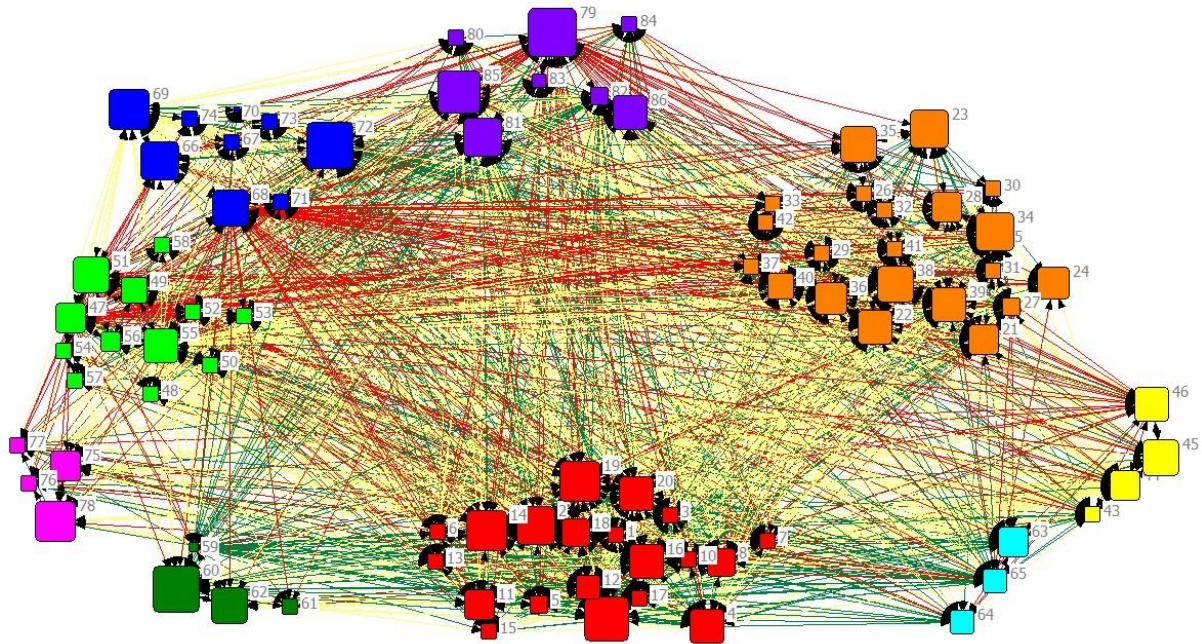


Figure 2: Friendship Network

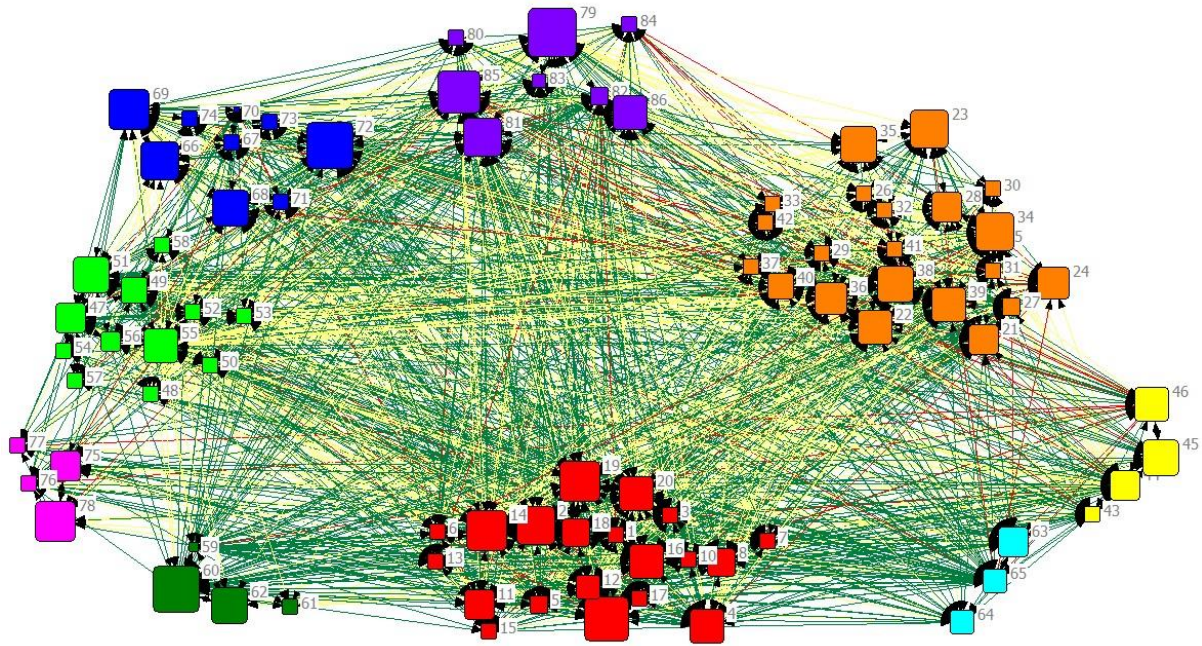


Figure 3: Support Network

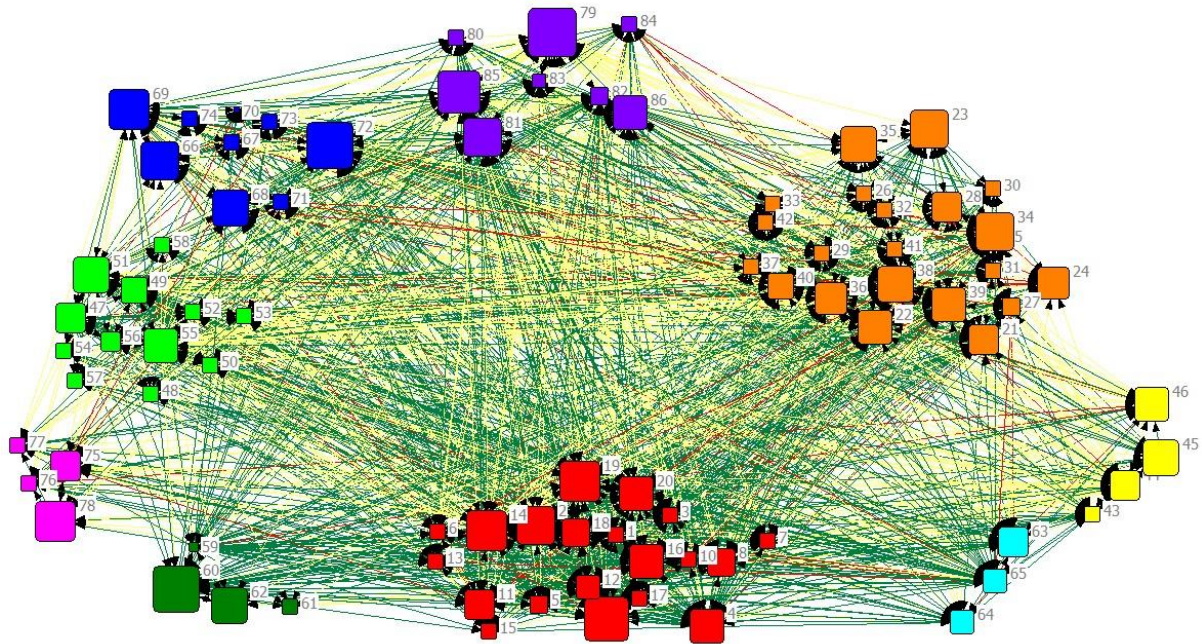


Figure 4: Positive Affect Network

DISSCUSSION

This is believed to be the first study where emotional intelligence is directly correlated with network centrality using social network methodology. Emotional intelligence has gained extreme popularity in organizational research and practice, with most people believing the fundamental notion that those with higher emotional intelligence have more and stronger relationships. The aim of this study was to broaden our understanding of how emotional intelligence is related to different social networks in an organizational setting. This study was built on previous research regarding emotional intelligence and social networks, and examined the connection of emotional intelligence to degree centrality. Although no hypotheses were supported, there is a great deal of interesting findings.

Not surprisingly, most of the different network centralities were correlated with one another. There was a high correlation between out-degree advice, and out-degree support, I expect that the reason behind this is people who choose to go to a person for advice, will also go to that person support, in the same way that people will receive support from someone who they have already provided support to (Bowling, Beehr, & Swader, 2005). With this explanation in mind, it isn't shocking that reciprocal advice ties and reciprocal support ties also had a moderately strong correlation, because those people who interact with one another for advice, would also reach out to those same ties for support. Although emotional intelligence was not correlated with these networks for this study, research has found that a person with higher emotional intelligence can predict anxiety in others (Weaving, Orgeta, Orrell, & Petrides', 2014). This ability to predict anxiety may lead them to provide advice and support to others which may support this finding.

Out-degree advice is also strongly correlated to out-degree friendship, most likely because people would get advice from people they consider their friends or they would develop friendships with people who are able to give them advice. Advice centrality was found to be influenced by helping behavior (Zhang, Zheng, & Wei, 2009), which could potentially have helped bring friendship and advice together. The reason for this could be that those people who offer help and advice may develop friendships with people they help or who help them.

There is a strong correlation between out-degree friendship and support, leading to the idea that people seek out support from their friends, or create friendships with those people who provide support. This is aligned with research stating that support helps with enduring friendships (Bailey, Finney, and Helm, 1975). Out-degree support is also strongly correlated to out-degree friendship, most likely because people would get support from people they consider their friends or they would develop friendships with people who are able to give them social support. A potential link between support and friendship could be empathy. Based on research by George (2000), empathy helps people provide social support, as well as maintain positive interpersonal relationships. Thus empathetic people may have some similar network connections within the friendship and support networks.

Friendship is also strongly correlated with positive affect presence, in both in-degree and out-degree, with the strongest relationship between out-degree ($r=.97$, $p=.01$). The reason behind this may be that people want to surround themselves with people who give off a positive affect presence. Even though emotional intelligence was not shown to correlate with centrality in friendship networks, previous research still provides evidence to a relationship between these two constructs. Specifically, Lopes, Salovey, Cote, & Beers (2005) and Lopes, et al, (2004)

observed that those with higher emotional intelligence are viewed more favorably, and have more positive social interactions.

The friendship network was correlated to at least one centrality in each of the other three networks (advice, support, and positive affect). I believe the reason friendship was correlated with all the other networks was because research has found that workplace friendships help workers share their experiences, behaviors, and knowledge with others (Lee, Yang, Wan & Chen, 2010). Because of these interactions people may become more connected in multiple networks.

With the relationship between friendship and support, and positive affect and friendship, it is predictable that both out-degree and reciprocal centrality for positive affect and support were strongly correlated. The reason for this could be that people who give off a positive presence would be better at providing support to others, and thus others would be more inclined to seek them out for support.

Within advice, friendship, and support there was an effect of age and tenure, and within all four networks there was an effect of full time employment. The reason for may be that these people will have more opportunity given their age and the amount of hours work so they can interact with people to develop their social networks.

Aspects of personality were correlated some of the different network centralities. Extraversion had a small to moderate correlation with reciprocal nominations of positive affect presence, the reason for this could be that those people who are extraverted enjoy being around others feel positive which may cause others to feel more positive around them. This would follow the idea of emotional contagion, where researchers Bono and Ilies (2006) revealed that some leaders will positively influence others mood. Agreeableness correlated with both

friendship and positive affect presence reciprocal centrality. This finding is easily explained by prior research, which found that agreeableness tends to lead people to select more friends, and be selected as a friend more often (Selfhout, et al. 2010). Personality research has also found a correlation between agreeableness and positive affect, and have mentioned that “extraversion and agreeable were identified as the dimensions with the greatest predictive capacity of positive affect (Veenhoven, 1984)” (as cited by González Gutiérrez, Jiménez, Hernández, Puente, 2005).

There is the possibility that the results for this study are true, and emotional intelligence is not related to network centrality. Emotional intelligence has been found to be related to valuable aspects of work, such as, job performance, work/life balance, and positive work-related attitudes (Sjoberg, Littorin, & Engleber, 2005; Carmeli, 2003). Network centrality was related to personality and the amount of time that a person spends at the office, which should be studied further. Thus, if there is not a relationship between network centrality and emotional intelligence, there is still important aspects of these constructs to examine in future research.

Practical Implications

These current finding may provide insights that could be valuable to organizations and practitioners. Agreeableness could be used in selection, if the work has been proven to require social ties and a personality measure can be used. Workplaces could use personality to slightly predict how centralized a person will likely be in their workplace. There could be more implications for emotional intelligence use in the workplace, after further research is done.

Limitations and Future Research Directions

Although the study has no findings, some limitations should be noted, considering they may be the reason there correlations were non-significant. The organization participating in this research was small, which limited the power. Research does suggest that in-degree centrality is

stable even with low sample sizes, so potentially the relationship could be retained with large networks (Costenbader & Valente, 2003), however, due to the small power a significant effect may not have arisen. Because of this issue, it would be desirable to replicate this study in a large organization.

Along with having a power issue, there was a great deal of variance in the different network centralities, conversely emotional intelligence had a very small amount of variance. Due to the low variance in emotional intelligence, it would be very difficult to explain the extreme differences in network centrality.

A limitation, due to the organization's request to keep the survey to a minimum, was the length of this survey. Because of this only single-item measures were used for the different network centrality, and short forms of the STEM, STEU, and personality assessments were used. The simplicity of the social network measures may have reduced the findings, to counteract this future research may want to focus on less networks at a time, and use multi-item scales. There may be an issue of reliability with the STEU-B because it only has moderate reliability ($\alpha=.63$). Emotional intelligence in general has been known for low reliability in measures (Conte, 2005). Another issue that could cause the non-significant results is that the centrality may not be in the emotional intelligence measure. This would be the case if people are attempting to be more serious in the workplace, and thus reducing their relational ties. Although they may change behavior they are not able to change their emotional intelligence. To counteract this is future research it would be recommend to use a multi-item measure for the networks, and a better measure of ability based emotional intelligence such as the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) V.2 (Salovey, Mayer, Caruso, & Lopes, 2003).

A final limitation of this study was the use of cross-sectional survey design, as per the request of the organization. Due to this, firm conclusions about direction or causality between constructs cannot be drawn. Future research should use a longitudinal method to examine emotional intelligence in relation to social networks, this would be exciting to see if relationships can develop over time. What researchers may attempt to do it work with new hires to see if those employees with higher emotional intelligence are able to become centralized within their new organizations network faster than those who are lower in emotional intelligence.

Another avenue for future research would be to look further into the relationship between emotional intelligence and centrality with leaders. Leadership has been found to be an important part of social networks especially with advice networks (Zhang & Peterson, 2011; Bono & Anderson, 2005). And research looking at emotional intelligence and leadership has been a main area of focus for a while, but most research is examining how emotional intelligence assist in effective leaders (George, 2000; Kerr, Gavin, Heaton, & Boyle, 2005; Mittal & Sindhu, 2012). These studies have examined the dimensions of emotional intelligence, and the meaning of being of effective leader (George, 2000; Mittal & Sidhu, 2012), and then comparing emotional intelligence MSCEIT scores with subordinate ratings of their supervisors (Kerr, Garvin, Heaton, & Boyle, 2005). With the previous research showing the connection of effective leadership behaviors and emotional intelligence it would be fascinating to examine leaders network centrality and see if those leaders who were higher in emotional intelligent were not only more effective but also more centralized in different organizational networks.

A negative aspect of network centrality that is not often considered is what being central may do to a person's work performance. If an employee is highly centralized with-in multiple networks, could all the social interaction negatively impact work, or potentially put additional

stressors on that employee? Some research has been done in regards to citizenship behavior (Bolino & Turnley, 2005), however future researchers may want to examine this relationship, or other negative aspects of network centrality.

Conclusion

Previous literature on organizational networks and emotional intelligence led to the belief that there is a relationship between a persons' emotional intelligence and how many relational ties they have with different people within their workplace network. The research examined four types of networks that could be found in a workplace; advice, friendship, support, and positive affect presence. Using data from an organization this relationship was investigated and the four hypotheses were not found to be significant. This research did have many limitations that could have caused the non-significant result, but due to the established research prior, it would be beneficial to research this idea in the future with a larger sample and improved measures.

APPENDIX: APPROVAL LETTER



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1
FWA00000351, IRB00001138**

To: **Andrea Leigh Hermsdorfer**

Date: **March 07, 2016**

Dear Researcher:

On 03/07/2016, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review: Exempt Determination
Project Title: Emotional Intelligence (Emotional-related skills) and Social Networks
Investigator: Andrea Leigh Hermsdorfer
IRB Number: SBE-16-12044
Funding Agency:
Grant Title:
Research ID: N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the [Investigator Manual](#).

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

A handwritten signature in black ink that reads "Joanne Muratori".

Signature applied by Joanne Muratori on 03/07/2016 08:42:22 AM EST

IRB Manager

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