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**INTERPRETING CHANGE AS CONTROLLABLE: THE ROLE OF CENTRALITY
AND SELF-EFFICACY**

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Interpreting Change as Controllable: The Role of Centrality and Self-Efficacy

ABSTRACT

Interpreting organizational change initiatives as controllable can mean the difference between achieving positive or negative outcomes. However, little is known about the factors that underpin such interpretations. This study examines how interpretations of controllability are influenced by individual centrality in social networks and change-related self-efficacy. Drawing on a sample of 148 U.S. public school teachers facing a significant organizational transformation, our analysis reveals that change-related self-efficacy fully mediates relationships between centrality within instrumental and expressive organizational social networks and individual interpretations of change controllability. Network centrality, and the associated access to information and social support that accompany it, are theorized to provide the confidence necessary to interpret change as within one's control. Drawing upon social network theory, we provide insights into how change is interpreted as controllable, and how the nature of change may dictate which types of centrality are most important for such interpretations. Implications for the broader understanding of change are also discussed.

Keywords: Change; Public management; Self-efficacy; Controllability; Change readiness

Interpreting Change as Controllable: The Role of Centrality and Self-Efficacy

The ways in which organization members interpret the uncertainty and ambiguity associated with change has great significance to the outcome of transformative initiatives (Lucas 1981; Rice and Aydin, 1991; Stensaker, Falkenberg, and Gronhaug, 2008). In particular, interpretations of change as controllable have been positively linked to more effective implementation, the recognition of opportunities during change, and higher levels of performance during and after change (Dutton and Jackson, 1987; Thomas, Clark and Gioia, 1993; White, Varadarajan and Dacin, 2003). Interpreting change as controllable involves an individual perceiving a change issue as something over which he or she can exert some influence (Thomas et al., 1993). By contrast, a change viewed as uncontrollable is one in which those involved see little opportunity to effect. Interpretations of a lack of controllability often elicit negative or counterproductive behaviors such as procrastination, disengagement, or avoidance (Strong, Wambach, Lopez and Cooper, 1979). This in turn can derail change enactment because it makes it unlikely that those involved will be willing to engage in the ongoing problem-solving that is necessary for successfully realizing change efforts (Kotter, 1996; Hinings and Greenwood, 1988). As such, understanding the factors that facilitate an interpretation of controllability by those implementing change is important for uncovering why some change efforts are successful and others are not. Given that major change initiatives are successful only between 25% and 33% of the time (Amis, Slack, & Hinings, 2004; Beer & Nohria, 2000; Meany & Pung, 2008), such insights have significant theoretical and practical implications.

While largely ignored in the change literature, we contend that social network theory can provide useful insights into the factors that contribute to interpretations of change as controllable. Social network theory suggests individuals become entrenched in social structures that influence

how one views reality, and regulate access to valued resources (Marsden & Friedkin, 1993). From this perspective, networks are comprised by interconnected actors and the relationships between them (Wasserman and Faust, 1994). Although no social network studies have examined interpretations of change directly, more general research on change has suggested that interaction within a social network may shape such understandings. For example, Rouleau's (2005) study of interactions among managers and clients involved in the Canadian fashion industry indicated that they impacted each other's interpretations of change in an ongoing dialectical manner. Furthermore, Balogun and Johnson (2004) found that interactions among middle managers at a British utility undergoing privatization facilitated acceptance of the change among organization members. These findings suggest that interpretations of change are, to some degree, influenced by the interactions one has in a social network. This, in turn, raises the possibility that holding a more central position in a network, in other words having a proportionally greater number of ties than those in more peripheral positions, may lead to a greater likelihood that change is interpreted as controllable.

Our logic here is based on research that suggests that a central position in a social network offers access to greater amounts of information, serves as a source of social support, and fosters creativity (Krackhardt and Porter, 1986; Marsden, 1988; Perry-Smith, 2006), all of which should be useful in developing insight into how to handle change, and ultimately interpreting change as controllable. Support for this contention comes from Rice and Aydin (1991) who found that social cues from referents positively influenced employee attitudes during change, and Schweiger and DeNisi (1991) who illustrated how access to information was important in fostering trust among employees during organizational transformations. Further, Meyer (1994) found that network centrality impacted individual perceptions of general organizational

conditions, suggesting that centrality might structure interpretations that are positively linked to change.

Thus, our purpose in this paper is to examine the role of network centrality in fostering interpretations of organizational change as controllable. In so doing, we position Bandura's (1977: 193) notion of self-efficacy, the "conviction that one can successfully execute the behavior required to produce certain outcomes," as an intervening mechanism in this relationship. Our position is that self-belief regarding how to act in a particular situation is likely to be tied to the availability of relevant information and support that comes from being a central member of a social network. For example, Pond and Hay (1989), in a laboratory study, found that the provision of information increased self-efficacy, a result supported by Jimmieson, Terry and Callan's (2010) study of government employees undergoing organizational restructuring. We further theorize enhanced self-efficacy should give change recipients the confidence necessary to cope with change issues and interpret them as controllable. In positing these relationships, we seek to establish a definitive linkage between centrality in social networks and interpretations of change as controllable, and also explicate the types of centrality that foster self-efficacy. Specifically, we examine how the centrality of US high school teachers in organizational social networks impacted interpretations of the controllability of a government-mandated change initiative, the *No Child Left Behind Act* (NCLB). Our analysis shows that change-related self-efficacy (CSE) provides the mediating link between centrality and interpretations of change as controllable.

Theoretical Framework

Interpretations of Change as Controllable

The importance of control is not new to the change literature. For instance, Walinga (2008) found that tolerance of a lack of control was essential for developing change 'readiness,' the inclination to accept, embrace, and adopt changes to the status quo (Holt, Helfrich, Hall, & Weiner, 2010). While a tolerance for lack of control has been theorized to be useful in creating a willingness to accept the uncertainties associated with change, research suggests that once the change has been introduced to the organization, viewing change as controllable is important for achieving positive outcomes (e.g. Thomas et al., 1993). This is an important distinction, and one that indicates a tolerance for lack of control is important for priming employees for change, while interpreting specific change issues as controllable upon introduction remains important for performance during, and the effectuation of, change (Cunningham et al., 2002; Dutton and Jackson, 1987; Hackman & Oldman, 1976; White et al., 2003).

This is significant because as change initiatives have become more ubiquitous in organizations, evidence has continued to mount that such campaigns often either fail outright or are never fully implemented (e.g., Beer and Nohria, 2000; Kotter, 1996; Meany and Pung, 2008). However, individuals who interpret change issues as controllable have been shown to make more accurate and realistic appraisals of a situation, and to have higher performance both during and following large-scale change events (Audia, Locke, and Smith, 2008; Nutt, 1984; Thomas et al., 1993). This in turn generates momentum for change, suggesting that interpretations of controllability are essential not only for individual performances during change, but also for the success of change efforts in general (Dutton and Duncan, 1987). By contrast, interpreting issues as uncontrollable is, according to Strong et al. (1979), likely to stifle the resilience and resolve that is vital in allowing individuals to cope appropriately with change-induced uncertainty

(Masten and Reed, 2002). Hence, individuals who perceive that a change is not controllable are more likely to disengage from the change process, and thus make effectuation less likely.

Network Centrality

A broad assumption of social network theory is that “individuals are embedded in social structures that influence their interpretations of organizational reality” (Ibarra and Andrews, 1993: 279; see also Marsden and Friedkin, 1993). This occurs because individuals are enmeshed in webs of relationships that provide them with access to information and social support (Gulati, Dialdin and Wang, 2002). Hence, social network theorists carry the assumption that one's social context is a source of information regarding interpretations and perceptions of one's environment (Meyer, 1994). That is, the pattern of ties among individuals in a network provides opportunities and constraints for individuals to access resources, receive information, and seek advice and/or social support (Borgatti, Mehra, Brass and LaBianca, 2009). Social networks consist of finite sets of actors and are comprised by the relationships between those actors (Wasserman and Faust, 1994). Different types of networks can exist in different settings depending on the content of the relationships – such as friendships, kinship, advice, or common interest – that have been established (Burt, 1997). Degree centrality, the relative extent to which the individual is connected to all others in the network, is salient in this respect as it quantifies an individual's relative number of relationships in the organization (Sparrowe, Liden, Wayne and Kraimer, 2001). In other words, the higher an individual's degree centrality, the more relationships one has within the network

A number of studies have suggested that an individual's degree centrality, and the associated access to information and social support that accompany such centrality, are positively and significantly related to a variety of important outcomes, including job creativity

(Perry-Smith, 2006), employee retention (Mossholder, Settoon and Henagan, 2005), job satisfaction (Dean and Brass, 1985), and promotion (Burt, 1992). Our contention is that the access to information and social support associated with degree centrality is also pivotal in fostering individual interpretations of change issues as controllable. Organizational change creates significant stress for change recipients (Ashford, 1988), and social support and access to information are useful for coping. Degree centrality provides this essential feedstock for maintaining sense and coping with the stress of change, although social support and access to information may be delivered in different ways dependent upon the network.

Social network theory distinguishes between two particularly important organization-based networks, *expressive* networks, also known as friendship networks, and *instrumental* networks, also known as advice networks (Tishy, Tushman, and Fornbrun, 1974). Expressive networks consist of interactions that are used predominantly for social support and friendship (Lincoln and Miller, 1979), while instrumental networks comprise work-role interactions and are based primarily on advice-seeking or -giving. Expressive ties tend to be stronger and involve more intimate interactions among individuals (Ibarra and Andrews, 1993; Marsden, 1988), while instrumental ties are weaker and based more often on task-related interactions (Ibarra, 1992). While there is a dearth of investigation into the role of network centrality on interpretations of controllability, it seems likely that centrality within both types of networks could facilitate interpretations of change as controllable, although in different ways.

Expressive Network Centrality and Interpretations of Controllability

Expressive relationships within an organization should make the process of social construction easier by providing ready sources of ideas. Higher degree centrality, indicative of a larger number of friends in an organization, should provide access to a large pool of information

that can be drawn upon to make sense of uncertain situations (Marsden, 1988). A larger number of friends provides more opportunities for interaction and for sharing ideas, greater levels of social support, and builds a belief that individuals are able to control the situations in which they find themselves (Masten and Reed, 2002).

Social network theory suggests that with greater degree centrality, individuals will have more extensive opportunities for interaction and information exchange (Ibarra, 1993). In the face of change, individuals will exchange stories, rumors, and insights about an upcoming transformation with friends (Balogun and Johnson, 2004). Through social interactions, more central individuals experiencing organizational transitions will be more likely to acquire social support and build social resiliency (Pearlin and Schooler, 1978). As social network theory holds that one's embeddedness in the network shapes interpretation (Walker, 1985), this suggests that degree centrality should thus be associated with interpretations of change as controllable because access to more information and social support acts as a store of resources the individual can draw upon in the face of disruption.

Hypothesis 1: Expressive network centrality is positively associated with interpretations of organizational change as controllable.

Instrumental Network Centrality and Interpretations of Controllability

Interpretations of change as controllable may also be shaped by centrality in instrumental networks. During change, employees often seek not only social support from friends, but also social and technical support from supervisors, mentors, and/or peers they believe can provide insight into how to cope with a change (e.g., Balogun and Johnson, 2005; Gioia and Chittipeddi, 1991). These types of relationships also build social resiliency in a similar, but less intimate, fashion as expressive relationships. Individuals need others in the organization from whom they

can learn, especially during uncertain or stressful times (Bell, 1998; Kram, 1985). Thus, a higher level of degree centrality in instrumental social networks indicates that an individual has more people from whom to seek advice during change.

Social network theory holds that instrumental ties are more useful for obtaining scarce resources than expressive ties (e.g., Ibarra and Andrews, 1993; Lin, 1982) suggesting that in addition to friends, employees might turn to individuals from whom they seek advice in order to make sense of organizational change. Many organizations implement a formal mentoring system, assigning a senior member to shepherd a junior member in the organization. Studies show that when the contact is one-way and top-down these relationships rarely foster social support or a sense of belonging in the junior member (Kram, 1985). However, when organization members build a larger network of referents from which to seek advice, social resiliency is a likely outcome (Dyer, 1987; Katzenbach and Smith, 1993). This indicates that greater levels of degree centrality in instrumental networks may foster not only higher levels of information about change but also increased social support and an increased likelihood that change will be interpreted as controllable.

Hypothesis 2: Instrumental network centrality is positively associated with interpretations of organizational change as controllable.

Change-related Self-efficacy

We position self-efficacy as a mechanism that intervenes in the relationship between centrality in social networks and change interpretation. Bandura (1997) notes that self-efficacy, or one's belief in his or her ability to perform capably, should not be theorized or measured as generalized feelings of mastery but should instead be tied to a specific situation or behavior. Thus for the purposes of this analysis, we focus on change-related self-efficacy (CSE) (Ashford,

1988). Change-related self-efficacy, one's belief in his or her ability to perform capably during change (Ashford, 1988) is based on Bandura's (1977) suggestion that several types of informational cues might bring about individual self-efficacy for specific behaviors. These include cues drawn from observing the actions of others, verbal cues aimed at persuading an individual of his or her ability in performing a task, experience by proxy through modeling behaviors of others, and enactive learning through repeated task execution.

People with high levels of self-efficacy are thought to be more active and persistent in handling threatening or dynamic situations (Moos and Billings, 1982), such as organizational change. Efficacious individuals are also more likely to view situations as learning experiences rather than traps, and as opportunities to demonstrate skills rather than threats (Ashford, 1988; Jones, 1983). Further, individuals high in self-efficacy tend to experience increased psychological well-being and job satisfaction (Jimmieson et al., 2010; McNatt and Judge, 2008; Wanberg and Banas, 2000). High levels of self-efficacy have also been linked to more effective employee adjustment among new hires (Jones, 1986). This finding is interesting because new entry into an organization clearly serves as a type of change for an individual, suggesting that more efficacious individuals are better able to cope with change, and quite possibly be more likely to interpret change as controllable. Thus, high levels of self-efficacy should foster an interpretation that events are within an individual's control in the face of the considerable dynamism and uncertainty brought on by organizational change.

As we noted earlier, social network theory holds that degree centrality in expressive networks provides greater access to information and social support (Marsden, 1988). This, in turn, should provide greater levels of confidence during periods of change. In essence, more information and social support should lead to a greater sense of self-efficacy during

organizational change. Interpreting specific changes as controllable appears more likely when the change recipient has confidence that he or she can carry out assigned tasks and duties during the transformation. Thus, in difficult situations, individuals low in self-efficacy are more likely to lessen their efforts or give up all together, while individuals high in self-efficacy will likely give more effort to make it though the situation (Stajkovic and Luthans, 1998). Thus, we posit that CSE acts as a mediator in the relationship between expressive centrality and interpretations of organizational change as controllable.

Hypothesis 3: The positive relationship between expressive network centrality and interpretations of organizational change as controllable is mediated by change-related self-efficacy.

We also theorize that CSE will be an intervening mechanism between instrumental network degree centrality and interpretations of change as controllable. Social network theory holds that degree centrality in instrumental networks should enhance CSE because it provides greater access to technical information regarding how the change should be implemented (Ibarra and Andrews, 1993; Wong, 2008), along with increased confidence resulting from the added social support and more numerous mentoring opportunities associated with higher degree centrality. Thus, while the content of expressive and instrumental relationships differs, CSE should be derived through centrality in both networks.

Change-related self efficacy's linkage with interpretations of controllability follows the same logic stated in hypothesis 3. While individuals low in self-efficacy tend to lessen their efforts when confronted with negative feedback or bad news, individuals high in self-efficacy tend to respond to such information with increased effort and motivation (Bandura and Cervone,

1986). For this reason, possessing a general level of self-belief in one's ability to perform capably during change should lend itself to interpreting specific change episodes as controllable.

Hypothesis 4: The positive relationship between instrumental network centrality and interpretations of organizational change as controllable is mediated by change-related self-efficacy.

While we propose that both expressive and instrumental centrality should both be significantly associated with CSE, differential effects are possible because of variations in the amount of social support and the richness of information provided by the relationships associated with each network. Social network theory holds that expressive relationships involve more frequent interaction than instrumental links (e.g., Krackhardt and Porter, 1986; Krackhardt and Stern, 1988; Krackhardt, 1990). Expressive links are also more intimate, which suggests the richness of interactions should be higher in expressive networks than in instrumental networks (Marsden, 1988). By contrast, instrumental ties are weaker and therefore may not expose focal individuals to the frequency or richness of interaction that comes from expressive interactions (Ibarra and Andrews, 1993). Thus, even though instrumental ties provide access to more technical information, mentoring, and resources during change (Lin, 1982), making instrumental centrality an important facilitator of CSE, we hypothesize that the social support and richness of communication associated with expressive centrality would be more useful in creating a sense of self-belief and resilience during change. Therefore, while both expressive and instrumental degree centrality should be positively associated with CSE, we posit that expressive centrality will be more strongly related.

Hypothesis 5: Expressive network centrality will be more strongly associated with change-related self-efficacy than instrumental network centrality.

Methods

Change Context

Once considered a mechanism to educate students in order to create a regular supply of capable workers for American industry, the mission of US public schools has evolved over time to one of preparing students to be not just skilled workers but also well-rounded citizens (Elmore and Sykes, 1992). The notion of public schools as “the best preparation for college and life” was codified in an 1893 report by the “Committee of Ten,” a body formed by the National Education Association (NEA), the largest teacher’s union in the United States (Elmore and Sykes, 1992). Consisting of ten educators led by Harvard University President Charles Elliot, the Committee was formed essentially to reconcile the debate on the proper role of public schools (Kliebard, 1987). The Committee’s report led to what became known as the “humanist” tradition, which led to the liberalization of school curriculum in order to prepare all students to do well in life, contribute to individual and societal well-being, and to prepare *some* students for higher education (Ornstein and Levine, 1993). Thus, the NEA endorsed the expansion of the curriculum beyond core academic subjects, a position it has maintained since the Committee of Ten’s report. This tradition continued over time as curricula were expanded to include various subjects beyond core academic areas, including those with cultural value such as art and music, and subjects designed to enhance student well being such as physical and health education (Elmore and Sykes, 1992).

However, recent interventions by US policy-makers, most notably the NCLB Act, have resulted in dramatically reduced educator autonomy and significantly less emphasis on non-core academic subject areas. A response to falling levels of academic achievement and increased gaps in performance between socio-economic and ethnic groups among US students, the NCLB Act

was intended to, among other things, increase accountability measures for teachers and administrators. The policy dictates that individual state governments, if they are to continue to receive federal school funding, must implement standardized assessments in English, reading and mathematics to all students in certain grades. The enactment of NCLB represents a shift from the humanist tradition to a more pronounced focus on student academic achievement, largely determined by their performance on standardized exams. This has led to a realignment of resources and increased attention on core subject areas, often at the expense of areas now considered peripheral. This sentiment was expressed by Reg Weaver (2007: 12A), the president of the NEA: “many school administrators now view time spent on the arts, social studies and science as a waste of time.” As such, it has created a fundamental shift in how teachers do their work.

Our research was centered on four high schools in Mississippi¹, a state with the lowest levels of educational attainment in the US (Crissey, 2009). The NCLB Act does not assert national achievement standards; these are instead set by each individual state. To this end, the Mississippi Department of Education (DOE) developed a system that assigned each public school an accountability rating from 1 (low) to 5 (high) based predominantly upon student performance on the standardized exams. These ratings serve as the performance measure used by the DOE to assess the quality of the school, its teachers, and administrators. Consistently low performance over a three-year period can result in a loss of accreditation and a takeover by the DOE. This outcome also includes the removal of administrators and low performing teachers, making it an ever-present concern for study participants.

¹ These schools were purposively selected to reflect variation in school size, location, economic background, and ethnicity of children served. Nothing was known about the teaching staff prior to the research commencing.

As such, teachers who participated in our study are very much aware of student performance issues and were under intense pressure to adjust to policies that would bring significant changes to their day-to-day lives, including formal and informal methods of evaluation, curriculum content, and instructional techniques. Teachers in the four schools in our study, as elsewhere, were enduring a transition from autonomous lesson-preparation that allowed students to explore creative pursuits to a highly standardized curriculum focused on performance on standardized exams. The transition also involved increased time spent on remediation for students experiencing performance lags, with reduced focus on instruction in art, music and physical education. Professionally, the policy meant that teachers now had quantifiable performance measures, and poor ratings could mean disciplinary action or even removal from one's job. As such, the change being put in place represented a large-scale re-ordering of teacher's work lives.

Participants & Data Collection

Network analysis calls for the determination of the boundaries of the network being investigated. This is an important step because boundary errors may create distortion of the overall configuration of actors in the network and missing data can have a significant impact on the results of the analysis (Laumann, Marsden, and Prensky, 1983). Thus, we defined the network population *a priori* as all teachers in each organization (N=156). Once the network boundaries were defined, we attempted to collect data from all organization members within the boundary because sampling the network could lead to an inaccurate depiction of social interactions (Ibarra and Andrews, 1993).

Participants voluntarily completed a survey during work time using a pencil-and-paper instrument. To ensure confidentiality, and given the sensitive nature of network responses,

participants were provided with a sealed envelope and returned the survey in-person to the first author, who spent significant time in each school. The final response rate for the survey was 95% (n=148) of the network population from the four public schools. Response rates by school were as follows: School 1, 92% (22/24); school 2, 96% (46/48); school 3, 95% (36/38); and school 4, 96% (44/46). The participants were 66% female, and the average age of participants was 42 years. The sample was 77% White, 18% African-American, and 5% other. Although these teachers were all employed in public schools in the same state, they were employed at different locations. Thus, because we collected data from four different networks, specific measures were employed to calculate centrality that would correct for the aggregation of the four disparate networks. These measures are described in the next section.

Measures

Network indices. Instrumental and expressive networks were operationalized through answers to a “close-ended” sociometric questionnaire. Each participant was provided with a full list of teachers in his or her respective school and asked who they considered to be a friend and from whom they sought advice. This approach allowed us to gather data from the full network. It also served to reduce measurement error by not restricting the participant to a fixed number of responses (Wasserman and Faust, 1994). Furthermore, by providing a full list of employees, the likelihood of errors of omission was reduced (Holland and Leinhardt, 1973).

Network centrality. From these responses, we calculated in-degree centrality within the expressive (friendship) and instrumental (advice) networks using UCInet software (Borgatti, Everett, and Freeman, 2002). We used in-degree centrality in that the more that co-workers choose a particular employee as a source of advice or as a friend, the greater that employee’s centrality in that network. By using an in-degree centrality measure, we removed potential

sources of measurement error. Specifically this approach helped to alleviate concerns over the definition of friendship or advice, and removed ambiguity about whether or not the friendship or advice-seeking relationship was reciprocated by both individuals (Krackhardt, 1999).

Although degree centrality is one of the most basic measures employed in social network analysis, our aggregation of four networks makes the analysis somewhat more complex than if there was just a single network under investigation. Because the four networks are of different sizes, an employee's degree centrality may be relative to the size of the network. For instance, an individual located in a network of ten who has eight friends and an individual located in a network of one-hundred who has eight friends would have the same centrality scores if centrality were calculated using Nieminan's (1974) original measure, but would clearly have different levels of relative centrality. In order to combat this problem, we instead used Freeman's (1979) measure that corrects for the size of an individual's network when aggregating responses by imputing the size of a network in an individual's centrality score. This approach allowed us to compare the relative centrality of individuals located within different networks without inflating the scores of individuals enmeshed in smaller networks (Freeman, 1979).

Change-related self-efficacy. Change-related self-efficacy was measured with Ashford's (1988) four-item scale, which asked employees to make generalized assessments of self-mastery about the salient organizational change, implementation of NCLB. The only adaptation of the scale is that our items referenced "change", while Ashford's items reference "re-structuring." Responses ranged from 1 = "Strongly Disagree" to 7 = "Strongly Agree." A sample item was "Wherever the changes take me, I am sure I can handle it."

Controllability. Interpretation of controllability was measured on a three-item scale adapted from Thomas et al.'s (1993) five-item measure. Responses ranged from 1 = "Small

Extent” to 7 = “Great Extent.” Participants were provided with a brief summary of NCLB’s provisions, and instructed, “Using the scale provided, please indicate the extent to which you agree with the following statements about the No Child Left Behind Act.” A sample (reverse coded) item is “I feel that how this change is resolved will be a matter of chance.”

Control variables. We included organizational commitment and turnover intentions as control variables. This makes sense at a theoretical level because uncommitted employees and those contemplating leaving the organization may withdraw from some relationships in the network, and also may be unconcerned about changes taking place in the organization. We also controlled for age and gender in order to account for the natural clustering of individuals with others in the organization who are similar. Thus, we controlled for these 4 variables in an effort to ensure the validity of our proposed relationships. Age was a self-report measure that asked the employee’s age in years, while gender was also self-reported. We coded this variable 1 for male and 2 for female. Organizational commitment was measured on a seven point Likert-type scale from 1 = “Strongly Disagree” to 7 = “Strongly Agree.” The measure was adapted from Mowday, Steers, and Porter (1979) and consisted of five items. A sample question was “In my job I am willing to put in a great deal of effort beyond that expected in order to help this organization be successful.” Turnover intentions were assessed on a five-point Likert-type scale from 1 = “Definitely No” to 5 = “Definitely Yes.” The measure was adapted from Hom and Griffeth (1991). It consisted of three items that ask about an individual’s intent to leave his or her job. For example, the third item was “I intend to quit my present job.”

Analysis

We used structural equation modeling procedures (LISREL 8.72; Jöreskog and Sörbom, 2005) to evaluate the fit of our measurement and structural models. The measurement model

assessed whether all items in a given scale represented the same latent factor. We tested our measurement model on our latent constructs, omitting expressive and instrumental centrality because they are single-index scores rather than multi-item psychometric constructs. We performed structural model tests using all study variables, following Bollen's (1989, 1990) recommendation to interpret multiple indices of model fit. We reviewed the χ^2 test, the Root Mean Square Error of Approximation (RMSEA; Steiger and Lind, 1980), the Comparative Fit Index (CFI; Bentler, 1990), the Normed Fit Index (NFI; Bentler and Bonnett, 1980), and the Goodness of Fit Index (GFI; Jöreskog and Sörbom, 1984). We also assessed the fit of the models by examining individual parameter estimates. We screened these estimates for improper solutions (e.g. negative variances), counterintuitive directionality, and inflated standard errors. We assessed the quality of the measurement model by searching for cross-loadings of the indicator variables.

Results

An item-level CFA revealed that the measurement model we specified fit the data satisfactorily ($\chi^2=20.54$, $df=13$, $p=ns$, $RMSEA=0.05$, $CFI=0.99$, $NFI=0.98$, $GFI=.96$). Further, each indicator loaded significantly on its model construct. Thus, the specified measurement model provided good fit and a simple structure. We tested an alternative measurement model with all items loading on one latent construct. This model fit poorly ($\chi^2= 989.35$, $df=14$, $p=.00$, $RMSEA=.68$, $CFI=0.00$, $NFI=-0.08$, $GFI=0.40$), providing more support for our specified measurement model. Table 1 presents the means, standard deviations, and reliabilities among model components. The model fit indices suggest excellent fit for our hypothesized structural model ($\chi^2= 33.18$, $df=25$, $p=ns$, $RMSEA=0.05$, $CFI=0.97$, $NFI=0.99$, $GFI=0.95$). As figure 2 shows, the path estimates for our hypothesized fully-mediated model indicate that both

expressive centrality ($\beta=.15$; $p<.05$) and instrumental centrality ($\beta=.46$; $p<.01$) are significantly related to CSE. Additionally, CSE is significantly related to interpretations of change as controllable ($\beta=.37$; $p<.01$). Together, these results support the notion that these relationships are fully mediated.

Insert figure 1 about here

To further test the mediation hypotheses, we compared our fully mediated theoretical model with partially-mediated and non-mediated models using nested model comparisons (Anderson and Gerbing, 1988). In the partially mediated model, we specified direct paths from expressive and instrumental centrality to interpretations of control while including all other specified paths from the theoretical model.

The partially mediated alternative model had satisfactory fit with the data ($\chi^2=29.16$, $df=23$, $p=ns$, $RMSEA=0.04$, $CFI=0.99$, $NFI=0.98$, $GFI=0.96$). However, the change in model chi-square was marginal and non-significant (χ^2 difference=4.02, $df=2$, $p=ns$), and as figure 3 illustrates, the path estimates from expressive centrality ($\beta=-.06$, $p=ns$) and instrumental centrality ($\beta=.13$, $p=ns$) to controllability were not significant, supporting full mediation over a partially-mediated explanation. In the non-mediated model we specified direct paths from expressive and instrumental centrality to interpretations of controllability and removed the indirect paths. The non-mediated model did not fit the data well, with several indices failing to meet requirements for good fit ($\chi^2=60.77$, $df=26$, $p=.00$, $RMSEA=0.10$, $CFI=0.96$, $NFI=0.94$, $GFI=0.92$). The fully-mediated theoretical model fit significantly better (χ^2 difference=27.59, $df=1$, $p=.00$). Thus, hypotheses 1 to 4 are supported, and our data indicate CSE fully mediates the relationship between the centrality variables and interpretations of change as controllable.

Further, because instrumental centrality is more strongly associated with CSE than expressive centrality, hypothesis 5 is not supported.

Insert figure 2 about here

Discussion

Our findings extend knowledge on interpretations of change as controllable in at least four ways. First, we draw on insights from social network theory to articulate the importance of network centrality in fostering interpretations of change as controllable. Second, we demonstrate CSE's role as a fully mediating mechanism in the relationships between expressive and instrumental network centrality and interpretations of change as controllable. Third, we explicate the differential effects of expressive and instrumental centrality on both CSE and interpretations of change as controllable. Finally, drawing on social network theory, we develop the ways in which our insights help advance our theoretical understanding of those factors that are influential in broader change processes. We discuss the theoretical and practical implications of these findings below.

Theoretical Implications

The paper's first contribution stems from the application of social network theory in understanding how centrality in social networks fosters interpretations of change as controllable. Degree centrality in both expressive (hypothesis 1) and instrumental (hypothesis 2) networks was linked to interpretations of change as controllable. Establishing this linkage brings the role of social interaction, social support, and mentoring to the fore of understanding how change is effectuated in organizations. Our findings suggest that creating dense webs of friendship and advice relationships allows change recipients to make sense of change and interpret change issues as controllable. As controllability is linked to effective implementation, fostering

centrality should thus be useful in effectuating change initiatives, an insight not previously revealed in the change literature.

The second contribution comes from explicating the mechanism through which centrality fosters interpretations of change as controllable. In hypotheses 3 and 4, we proposed that CSE would be this intervening link. Findings indicate centrality in both types of networks built confidence in teachers about their ability to handle change. This result is interesting because it suggests the social support and efficacy that is provided by friendships are very important during change, an insight that has not been empirically established in the literature. In terms of expressive centrality, interactions with friends provide support and comfort during what can be periods of sustained uncertainty and fear (Tishy et al., 1974). This in turn helps to create a belief that one can function effectively even during change. This finding buttresses insights from the social support literature that indicate supported individuals are more optimistic, spend more time learning new things, and perceive greater organizational support (Greller and Richtermeyer, 2006; Friedman, Kane and Cornfield, 1998).

Instrumental centrality was also linked to CSE, suggesting that the access to technical information and mentors afforded by centrality in instrumental networks creates a strong sense of self-efficacy about change. Hence, the more access to information, mentors, and social support, the more confidence an individual is likely to gain about his or her ability to perform during change. While instrumental centrality has been previously linked to power in organizations (Ibarra, 1992; 1993), our study sheds light on its value in building confidence in individuals during change. Indeed, our results suggest employee embeddedness in social networks may be much more important for effectuating change than previously thought.

We proposed that CSE was subsequently linked to interpretations of change as controllable, and thus served as a mediating mechanism between centrality in both networks and interpretations of change as controllable. Our findings support the idea that a belief in one's own effectiveness is likely to impact whether an individual will even attempt to cope with change. Conversely, doubt in one's own ability will lead to a failure to engage in the sensemaking processes necessary to interpret change as controllable. Thus, because organizational change is filled with uncertainty and ambiguity, confident individuals are more likely to believe they can direct outcomes and maintain sense during change. Our finding that CSE fully, rather than partially, mediated these relationships is interesting because it suggests that network centrality contributes to an interpretation of controllability, but not directly. Rather, the access to information and social support that accompanies centrality develops an individual's self-efficacy thus enhancing the perception that change is controllable. Our results also clearly explicated CSE's role as an intervening mechanism between centrality and interpretations of change as controllable, an important contribution because it sheds light on the way in which individuals can better cope with change initiatives.

Our third contribution is to show that during change, instrumental ties are most important for making sense of the transition, suggesting that access to resources and technical expertise is more important for individuals in coping with organizational transformation than purely social support. This was contrary to what we proposed in hypothesis 5. While this finding was initially surprising to us as we expected more intimate relationships to provide greater feedstock for self-efficacy, insights from social network theory give rise to an explanation. Because friendships tend to be strong ties that involve dense clusters of lateral relationships (Krackhardt, 1992), they are better suited to providing social support than access to information and resources

(Granovetter, 1973). Instrumental relationships, by contrast, are more likely to be weak ties that serve as connections to disparate parts of the organizational system (Ibarra, 1992) and are thus critical for effectuating projects that require new information, such as change initiatives. In other words, the provision of resources and technical information from instrumental links was shown, in a change context, to be more relevant for developing self-efficacy and subsequently perceiving change to be controllable than the provision of social support from expressive ties.

This contrary finding provides significant insight into how different types of centrality might be more or less important depending upon the nature of the organizational change. Beyond the normal demands of large-scale organizational change, the pressures exerted by implementation of NCLB in many ways constituted a violation to the professional norms for teachers (Amis, Wright, Dyson, Vardaman and Ferry, in press; Hallett, 2010). In the US, public education was historically guided by an ethic of liberalization, where teacher autonomy and creativity were promoted and teachers valued the freedom to reach students in a variety of ways (Kliebard, 1987). However, the accountability measures established by NCLB have created a culture in US public schools in which teacher autonomy and creativity have been taken away in an effort to create a standardized curriculum. Thus, the teachers we studied dealt not only with the uncertainty about what it means for them to be a teacher, but also with technical aspects of the tasks they were executing. This need for technical information and expertise appears to have made instrumental ties more important for generating self-efficacy.

Our findings therefore suggest that instrumental ties are most important for creating self-efficacy during change, at least in situations where the change fundamentally alters the tasks of the change recipient. While expressive ties will still be drawn upon to make sense of a transformation, in this situation change recipients needed to rely more heavily upon mentors and

supervisors in order to generate self-efficacy and interpret the change as controllable. By contrast, in situations where employees face changes without a fundamental alteration of task requirements, expressive ties may be more important for creating self-efficacy about change requirements. In other words, expressive ties may have more value in structuring controllability during change that is not frame-breaking. Future research should investigate this possibility.

Our final contribution here involves situating our theoretical findings in the larger context of change. Research on change readiness highlights the importance of creating a receptiveness to change campaigns before attempting organizational transformation (Armenakis, Harris and Mossholder, 1993). Creating readiness among change recipients has been theorized as a critical factor in the successful implementation of change programs (Gregory, Armenakis, Harris and Shook, 2009). Classic studies of change offer perceived control as a factor in change readiness and participation (e.g., Hackman & Oldman, 1976; Cunningham et al., 2002), while interpreting change issues as controllable has been linked to positive outcomes during change (Thomas et al, 1993). However, Walinga's (2008) study of a North American soccer team posited that because some changes cannot be controlled, techniques for fostering control could actually produce anxiety in change recipients and hinder change efforts when control is lost. Walinga (2008) thus suggested that a tolerance for lack of control was important for creating readiness. The idea was rather than having "power over" change, change recipients should have the "power to" adapt to organizational transformation.

While this finding would appear at first look to be contradictory to our results, in fact the two studies work in concert to more fully explain change outcomes. Walinga's (2008) study suggested that tolerance for a lack of control creates readiness and builds self-efficacy in change recipients. Our findings suggest centrality in social networks builds self-efficacy and aids change

recipients in interpreting specific change issues as controllable. There is an important distinction here. Tolerance for a lack of control and interpretations of control are different concepts, and one can simultaneously have a tolerance for lack of control while interpreting specific changes as controllable. In fact, we suggest that this is an ideal condition, and that centrality in social networks may indeed foster both conditions. Centrality in social networks creates resiliency through the access to social support associated with being highly connected in a network. Socially supported individuals should be more *tolerant* of a lack of control prior to and during change, as the resiliency that is fostered by social support creates a sense of imperviousness to the abstract specter of change. However, once organizational transformation programs are introduced and the abstract notion of change is converted into tangible duties and tasks for the individual (as in our study), that same resiliency and social support allows the individual to interpret the change as controllable, and thus achieve more positive outcomes (Thomas et al., 1993). In other words, centrality in social networks may be useful both in fostering a tolerance for lack of control, as well as interpretations of specific change events as controllable. Therefore, tolerance for lack of control and interpreting specific change issues as controllable are not mutually exclusive, and in fact may be complementary. Change recipients may have both the “power to” and “power over” change. This insight helps resolve some of the underlying confusion about the role of control in the change process, and highlights the importance of fostering relationships in organizations.

Centrality in social networks therefore could facilitate both a tolerance for a general lack of control – and thus increased readiness for change in general – prior to the introduction of a change, as well as interpretations of change as controllable upon the introduction a specific change program. The presence of dense webs of relationships could thus enhance both readiness and implementation. As part of the organizational effort to create readiness, facilitating

relationship-building can create high levels of centrality in potential change recipients, as the social support and resiliency associated with such centrality appears to be useful both prior to and after the introduction of change initiatives. Future research should thus consider whether centrality in social networks fosters a tolerance for lack of control in the same way it fosters interpretations of controllability. Investigating this question would provide fuller insight into the import of dense webs of relationships in the organization throughout the change process. This would also help address how large-scale changes should be sequenced, something that has been long-called for in the literature, but that remains poorly understood (e.g., Amis, Slack, & Hinings, 2004; Pettigrew, Woodman, & Cameron, 2001).

Research on the pacing of organizational change indicates that fast-paced change to high-impact elements of the organization is vital for change effectuation (Amis et al., 2004). The present findings also provide insight on the import of relationship-building in effectively carrying out this type of pacing strategy. Our results show network centrality creates confident employees who are more likely to view change issues as controllable. During fast-paced change attempts, maintaining a sense of control would seem vital not only for implementing change, but also for maintaining adequate performance during such rapid transitions. Given this, dense networks of actors would appear to be vital to the success of fast-paced change efforts. Having confident individuals who can make sense of change issues would appear indispensable for pursuing a fast-paced approach to change. Future research should investigate this possibility. Understanding the role of dense social networks in determining the speed at which organizational change takes place would add value because of the importance of pacing in the effectuation of change initiatives.

Managerial Implications

This work also highlights centrality's potential import in enhancing the effectiveness of change implementation. Our findings suggest change recipients entrenched in social networks are more likely to view change as within their control, thus making both change effectuation and the maintenance of performance during change more likely. Apparent then is the idea that leaders in organizations should not ignore the importance of relationship-building at work. Providing employees with opportunities to build instrumental and expressive relationships through activities such as formal mentorship programs, instigating open-door policies, off-site leadership training, and social events should provide significant benefit at relatively low economic cost to the organization. These relatively inexpensive programs may offer significant returns when organizational change is inevitably attempted.

In practice, effective relationship building in the organization should allow for both lateral and bottom-up interaction, so that centrality in both expressive and instrumental networks can take place. Particular efforts at fostering relationships should be made in the foreground of planned change initiatives, as developing greater centrality in social networks appears to be an important part of change readiness efforts. Employees should have multiple sources from which to seek advice and social support in preparation for the stress that accompanies such initiatives. With this in place, employees will have greater levels of belief in their abilities to perform capably, and will be more likely to view change issues as controllable. These conditions will make effectuation of the change much more likely, and increase the likelihood of effective implementation above the 25% success rate observed in other studies (e.g., Beer and Nohria, 2000).

Limitations

We would be remiss not to mention possible limitations in our study. Centrality and controllability were measured on the same instrument at the same point in time, suggesting that some of the variance explained may result from mono-method bias. Although common method variance does not always skew relationships, it could be suggested in this case that relationships between study variables might be artificially inflated by having participants respond to questions about both on the same survey. However, we suggest that such an alternative explanation appears less likely than our theoretical explanation for several reasons.

First, the centrality data were derived from a sociometric questionnaire and the variables were indices produced via an algorithm, while controllability was measured using a psychometric scale. This is important because a suggested technique to address common method bias is to have predictor and criterion data come from different data sources (Podsakoff, MacKenzie, Lee, and Podsakoff, 2003). Our use of sociometric data that were transformed via an algorithm for the predictor and psychometric data from the criterion meets this standard. Second, we used different endpoints and scales for the predictor and control variables as suggested in Podsakoff et al. (2003), and our hypothesized relationships have a strong conceptual underpinning based on our use of previous literature to build our hypotheses. Finally, in order to test the potential severity of mono-method bias, we empirically contrasted our theoretical model with a mono-method model. In the mono-method model we hypothesized that each of the items in this study is an indicator of the same underlying latent method factor. Compared to our theoretical model, the one-factor model fit the data poorly ($\chi^2 = 977.62$, $df = 14$, $p = .00$, $RMSEA = .68$, $CFI = 0.00$, $NFI = -0.15$, $GFI = 0.40$). Although an insensitive diagnostic tool, this test provides some evidence that common method bias is not the likely explanation for our findings.

Another possible limitation is the generalizability of our findings. Our sample consisted of teachers in public schools. While schools do differ from private-sector companies in that they operate in highly institutionalized environments with large-scale government influence, public school teachers face similar performance pressures to private-sector employees, which is likely to mean that teachers interpret issues in similar ways as those in for-profit organizations. Further, large-scale government intervention is becoming a reality for all organizations, particularly in the wake of the 2002 *Sarbanes-Oxley Act* in the US, and more recently the global financial crisis. In addition, a plethora of generalizable organizational research has taken place in public-sector settings, including public schools. For example, Meyer's (1977) and Rowan's (1982) work on public schools, Tolbert and Zucker's (1983) investigation of the US civil service, Hinings and Greenwood's (1988) research on local government in the UK, Pettigrew, Ferlie and McKee's (1992) examination of the British National Health Service, and Amis, Slack and Hinings' (2004) work on Canadian national sport organizations have all made notable contributions to our understanding of organizational change. However, future research might consider these relationships in private-sector organizations in order to test the generalizability of these findings.

Finally, the scale we employed to measure interpretations of controllability has been validated primarily on samples of managers (top managers and middle-managers). However, the scale items in no way suggest that the responses would only inform the interpretations of managers, and the results from our CFA show evidence of convergent and discriminant validity among our constructs, indicating construct validity. Further, the prompt given was tailored to the specific change issue at hand (NCLB), which directly impacted the lives of study participants, suggesting that the information gleaned from the study properly reflects participant interpretations.

Concluding Remarks

The ubiquitous nature of change in organizations means that managers and theorists will continually search for more effective ways to manage the changing process. Our findings suggest that when attempting organizational transformation, careful consideration should be given to the social context of relationships and the nature of interactions among employees. We found that advice rather than friendship centrality was more important for generating CSE among change recipients, suggesting that access to supervisors and mentors may be more important than access to friends during change that fundamentally alters the way in which work is done. However, the significance of both types of social network should not be underestimated by theoreticians and practitioners interested in furthering understanding of one of the most difficult of organizational practices, the implementation of large-scale change.

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TABLE 1
Correlations and Descriptive Statistics for Study Variables

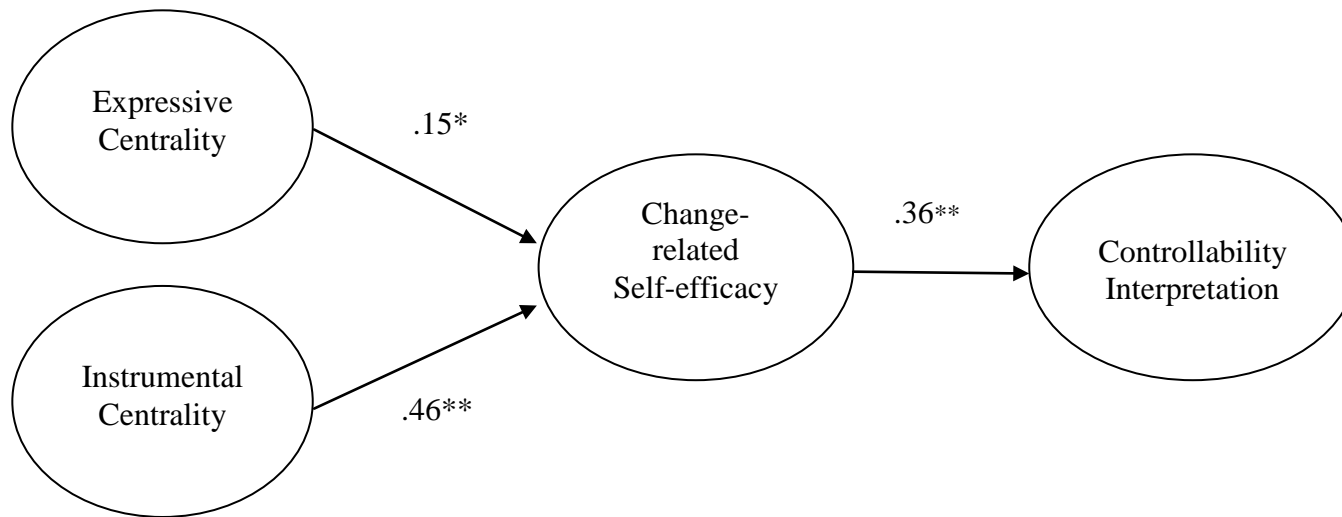
Variable	M	SD	1	2	3	4	5	6	7	8
1. Age	42.28	14.28	-	.02	.08	-.04	.03	-.05	-.06	.05
2. Gender	1.66	.49		-	-.10	.02	.11	-.08	.01	.03
3. Organizational Commitment	5.93	.87			(.73)	-.59**	.24*	.07	-.04	.01
4. Turnover Intentions	2.12	1.17				(.87)	-.09	.03	.18*	.13
5. Expressive Centrality	.23	.08					-	.07	.17*	.08
6. Instrumental Centrality	.50	.22					.05	-	.42**	.24**
7. Change-related Self-efficacy	4.27	1.83					.17*	.42**	(.92)	.52**
8. Controllability	3.94	1.28					.06	.34**	.51**	(.82)

Note: N=148. Reliabilities (Cronbach's alphas) are in bold italics and given in parentheses on the diagonal. Correlations above the diagonal are for raw summary scale correlations. Correlations below the diagonal are partial correlations with Organizational Commitment and Turnover Intentions partialled out.

* p < .05

** p < .01

FIGURE 1
Results from Fully-Mediated Structural Model



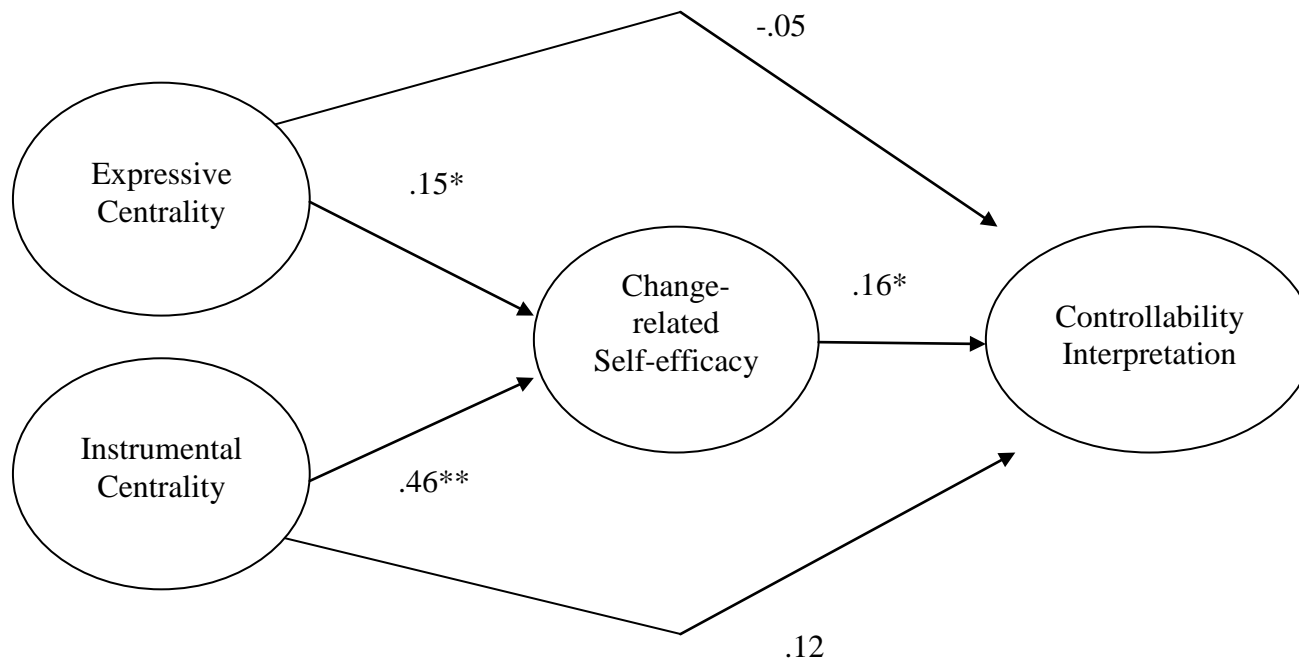
Note: N=148. Coefficients are completely standardized path coefficients with age, gender, organizational commitment and turnover intentions partialled out.

* p<.05

**p<.01

FIGURE 2

Results from Partially-Mediated Structural Model



Note: N=148. Coefficients are completely standardized path coefficients with age, gender, organizational commitment and turnover intentions partialled out.

* $p < .05$

** $p < .01$