Downsizing and Structural Holes: Their Impact on Layoff Survivors' Perceptions of Organizational Chaos and Openness to Change

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Abstract

Organizational downsizing places many strains on surviving employees. Despite the implicit relationship between changes to communication networks and employee responses, few studies examine downsizing-induced network changes or the impact of these changes on employees. This longitudinal investigation examined fluctuations in structural holes within a hospitality company's corporate headquarters resulting from the loss and gain of communication contacts. Building on Burt's treatise on structural holes, we tested a measurement of structural holes and its relationship to layoff survivors' perceptions of organizational chaos and their willingness to participate in planned, post downsizing changes. Although the downsizing had a modest impact on surviving employees' structural hole experiences overall, the structural hole index was a significant predictor in longitudinal and within time period comparisons of employees' perceptions of chaos and openness to change.

Downsizing and Structural Holes: Their Impact on Layoff Survivors' Perceptions of Organizational Chaos and Openness to Change

Employees face many challenges following a downsizing. Layoff survivors experience the loss of coworkers, friends, supervisors, subordinates, and access to valued organizational resources (Brockner, 1988). The loss or reconfiguring of relationships can influence employee morale, well-being, self-esteem, and performance (Kozlowski, Chao, Smith, & Hedlund, 1993). Changes in communication network relationships and their impact on layoff survivors is of great interest to organizational scholars for at least two reasons. First, the trend of laying off workers and dramatically changing the networks of survivors shows the tenuous nature of modem employment. Second, the opening or closing of structural holes in survivors' networks can provide a communication-based understanding of a downsizing's impact on employee responses.

Members of a network or a series of networks compete for valuable resources to maximize their power. Structural holes exist in a network where links to unique sources of information or resources are not present. Conversely, the addition of links providing unique sources of information or resources closes structural holes. Structural holes in networks are usually conceptualized at the macro level where actors in markets and organizations compete for valued resources (Burt, 1992a). However, the application of structural holes at the individual level can also be beneficial, especially in the case of organizational downsizing. By examining the impact of the opening and closing of structural holes on the attitudes and perceptions of downsizing survivors, researchers can explore why some employees remain upbeat when a downsizing casts a pall over most workers and emphasizes their vulnerability. Such research can also explore macro-micro linkages within organizations that are often neglected in organizational research (Jablin, 1987; Krackhardt & Porter, 1985, 1986; Monge & Eisenberg, 1987; Rousseau, 1985; Sparrowe & Liden, 1997; Staw & Sutton, 1993). Thus, the goals of this article are to (a) create an index that measures structural holes in communication networks prior to and following an organizational downsizing and (b) assess the impact of structural holes on layoff survivors' perceptions of organizational chaos and openness to change.

Organizational Downsizing and Structural Holes

Structural Holes

A structural hole exists when two members who are not directly connected to one another also lack common network contacts. Structural holes make networks constrained or sparse as individuals have fewer opportunities to access information and other resources. In an organizational unit with many structural holes, members may exchange a considerable amount of information and resources with one another (i.e., redundant contacts) but will have few unique contacts (i.e., nonredundant contacts) with others outside of the unit. In an organizational unit with few structural holes, members will share a considerable number of redundant contacts within the unit and will have a large number of extra-unit connections. Therefore, employees with many structural holes in their network depend on their supervisor or a few prominent network contacts for information and opportunities and are less likely to receive promotions. In contrast, employees with few structural holes receive information and opportunities from numerous sources and are more likely to capitalize on their unique connections to advance in the organization.

Structural holes can provide information access and power opportunities for network members and can create inequality between members. Structural holes also vary in their influence on network members. For example, when a downsizing results in an employee receiving a new supervisor who also brings unique contacts, the employee gains new information or resources through the new connection. Conversely, the change in network relationships can also create inequality among other network members who lost connections in the supervisory change or who are denied connections by the new supervisor. An individual's gain or loss from a structural hole is contingent on the individual's access to available resources.

The potential gains and losses associated with structural holes in pre- and postdownsizing networks derive from three types of opportunities (or "capital"; Burt, 1992b, p. 8): social, human, and financial. Social opportunities arise from the formation of new social relationships with others, and are available to all network members. Human opportunities represent the education, experience, and know-how an individual brings to others. Financial opportunities represent tangible resources such as money, investments, or equipment that are needed to perform work functions and are not necessarily equally available to all network members. Lost social ties may be particularly difficult to replace and can leave network members isolated. For instance, a downsizing in your department or unit can leave fewer members with whom to interact (a loss of social capital). A downsizing can also remove a coworker who was helpful in solving specialized statistical or mathematical applications (a loss of human capital) or whose talents included quick travel authorizations or equipment purchases (a loss of financial capital).

Burt's (1991, 1992b) measurements of structural holes are principally based on indicators of structural autonomy. Structural autonomy examines how access to unique information and resources is limited by connections to network members (Burt, 1992b), but does not explicitly consider network influence or position as a means to gain access to resources. In contrast, prominence explicitly considers the influence inherent in network positions. Existing studies of structural holes use various indicators including prominence (e.g., Ibarra, 1995) but provide little information to explain why certain indicators are used and others are not. A combined index of prominence and autonomy indicators to measure structural holes under conditions of downsizing can (a) provide a unified instrument to assess specific dimensions of the structural hole construct, (b) reveal which indicators should be included in a unified structural hole measure, (c) examine structural holes' impact on the individual by associating network properties with individual-level perceptions and attitudes in organizations, and (d) further explain layoff survivors' reactions to shifts in their postdownsizing communication networks. For the purpose of establishing a reliable and valid measure of structural holes at the individual level of observation, tests weighing the contribution of potential indicators to a theoretical construct and to relevant outcomes must be undertaken.

The Measurement of Structural Holes

Cohesion and structural equivalence assumptions are fundamental to any network analysis. Cohesion represents the extent to which two network members have regular and frequent interactions (Burt, 1992a; Johnson, 1993), and structural equivalence describes the extent to which they have the same or similar contacts (Burt, 1991). The degree to which cohesion and structural equivalence impact employees in a network is described as the sum of a member's opportunity and constraint in a network, also known as "structural autonomy' (Burt, 1992b, p. 44). Burt (1991) identified eight indicators of structural autonomy: (a) nonredundant contacts, (b) network contacts, (c) contact efficiency, (d) proportional density, (e) network density, (f) constraint, (g) oligopoly, and (h) hierarchy. Together, these items describe structural holes by generating scores on a continuum, usually ranging from .00 to 1.00. Rather than identifying employees as acting in the absence or presence of a structural hole, scores of greater magnitude indicate that a network member is experiencing more structural holes. The following section describes the indicators of structural autonomy, their relationships to structural holes, and how they would be affected by an organizational downsizing (see Table 1).

NONREDUNDANT CONTACTS

Nonredundant contacts are a network member's unique or nonduplicated sources of information and resources. Scores of nonredundancy range from zero to the possible number of contacts in the network (*N* - 1) and represent the effective size of a member's network (Burt, 1991, 1992b). These contacts represent a source of advantage to the recipient of the nonredundant contact (Burt, 1991, 1992b). As a result of downsizing, nonredundant ties can be lost by either dismissal or by becoming redundant. When nonredundant contacts are lost and not replaced, the void created represents a structural hole.

CONTACTS

Network contacts represent the number of members connected to an employee (Burt, 1991, 1992b). The number of contacts can range from zero (for an isolated network member) to the possible number of contacts in the network (*N* - 1). Although downsizing will decrease the number of contacts possible for any network member, losing contacts per se does not form a structural hole. Contacts gained or lost can be either redundant or nonredundant. The loss of nonredundant contacts leads to the creation of structural holes, as their absence reduces available information and opportunities.

CONTACT EFFICIENCY

Contact efficiency is the number of nonredundant ties divided by the total number of contacts. Efficiency indicates what proportion of a member's contacts are nonredundant (Burt, 1991, 1992b). The loss of efficiency in a network can result from a decrease in nonredundant contacts and/or an increase in total contacts. Downsizing can increase or decrease network members' efficiency depending on the losses (or gains) they experience. Structural holes emerge where efficiency is lost.

PROPORTIONAL DENSITY

This measure reports the proportion of contact pairs that are directly connected to each other. Density scores range from zero, indicating no relations between contacts, to one, indicating all pairs of contacts are connected (Burt, 1991, 1992b). As more contact pairs become connected, the proportional density experienced by an individual increases. The number of structural holes experienced by a member should decrease with higher proportional density, indicating a greater distribution of contacts and greater redundancy. Conversely, lower proportional density represents a smaller distribution of contacts and a greater possibility for structural holes.

NETWORK DENSITY

An alternative measure to proportional density, network density reports the "strength" surrounding the relationships of contact pairs (cf. Granovetter, 1973, 1982). Strength refers to the "numerical description of the amount of interaction between two network members" (Monge & Contractor, 1987, p. 108) that is based on the distance or closeness between them. Network density scores range from zero, indicating no relations between contacts, to one, indicating maximum strength between contacts (Burt, 1991, 1992b). As network density increases, the number of structural holes experienced by members should increase because members will have denser but fewer relationships. Conversely, lower network density represents a greater distribution of contacts and a decreased potential for structural holes.

CONSTRAINT

Constraint represents the distribution of relationships across a member’s network (Burt, 1992b). Constraint indicates to what extent a member’s interaction is dependent on a limited number of network members. Constraint scores vary from zero, indicating many redundant contacts, to one, indicating only one contact (Burt, 1991). Constraint is positively related to the formation of structural holes, as high constraint indicates more structural holes for an employee. An organizational downsizing leaves network members more constrained with fewer opportunities for nonredundant contacts, and hence more structural holes.

OLIGOPOLY

Oligopoly refers to a member’s ability to substitute one set of contacts for another that is less constrained. Oligopoly scores range from zero, indicating high substitutability, to one, indicating low substitutability (Burt, 1991, 1992b). Employees with high levels of oligopoly have a high substitutability in their relationships and a lower possibility for experiencing structural holes. Downsizing may limit network members’ ability to locate substitutes for their existing relationships.

HIERARCHY

Hierarchy is a measure that represents the portion of constraint present across all member relations. Hierarchy is derived from a logarithmic transformation of the constraint measure including contacts and constraint (Burt, 1992b). Scores vary from zero, indicating equal constraint from all contacts, to one, when all constraint comes from one contact (Burt, 1991, 1992b). Hierarchy indicates to what extent constraint is found in a network member's most regular contacts (Burt, 1991, 1992b). Employees with high hierarchy scores will experience more structural holes as limited network contacts leave fewer opportunities to replace or expand existing network opportunities.

Research on Structural Hole Indicators

Network research to date uses a variety of the above indicators to measure structural holes. Burt presents two studies in his extensive description of structural holes. In a longitudinal analysis of product markets under stable market conditions, the first study (Burt, 1992b) examined the relationships between structural holes and producers' ability to negotiate prices with both suppliers and consumers. Structural holes are measured by (a) producer concentration, indicating the lack of structural holes between producers; (b) constrained supplier-consumer interaction, representing the extent to which producers are constrained by the alliance of suppliers and consumers; and (c) density, the extent to which the bulk producers' output is distributed to limited consumer markets. The results reveal that as producers experience more structural holes, their autonomy decreases (and profits decrease). Yet, when suppliers and consumers experience fewer structural holes, their autonomy and profit decrease.

In a second longitudinal study, Burt (1992b) examined the promotion rate of 284 managers from a large, diversified company based on their proximity to structural holes. This investigation incorporated a measure of constraint to assess structural holes. Specifically, Burt asked managers to indicate how “close” they perceive themselves to other network contacts in order to produce a “closeness” score for each manager. Each manager’s overall closeness score was then related to the number of days since their last promotion. These analyses indicated that managers in conditions with higher levels of structural holes were promoted more quickly, implying that structural holes lead to greater network influence and resources. However, the effects of structural holes vary among different subgroups in the sample (e.g., women and older workers), suggesting that structural holes are not equally advantageous to all.

In a related study, Ibarra (1995) used indicators of autonomy (e.g., density and contacts) to examine the effects of minority interaction in informal managerial networks. Ibarra reported that structural holes affect managers differently due to constraint in their network relationships. Specifically, when access to information or resources is limited, structural constraint inhibits minorities’ development of organizational network relationships (Ibarra, 1995).

In sum, these studies use a number of structural autonomy indicators to measure network interactions and structural holes. These studies suggest that the configuration and location of communication relationships are dynamic and can affect other organizational factors such as promotion rate or access to organizational resources. Nonetheless, these studies provide little guidance to researchers for which indicators to use or exclude. If each of the structural hole indicators tap into various dimensions of the structural hole construct, the combined indicators should yield a single measure of a structural hole in a network. Further, these indicators should contribute equally when measuring the latent construct (structural holes) and be similarly related to other variables of interest (Hunter & Gerbing, 1982). It is also unclear why few researchers have included prominence in the measurement of structural holes, since network prominence provides critical information on power relationships among network members.

Prominence

Whereas structural autonomy measures an employee's contacts, information, and access to opportunities, prominence (or centrality) examines the extent to which a network contact is valuable or in demand by others (Brass & Burkhardt, 1992; Burt, 1991). Network members who offer valuable or interesting characteristics are typically more prominent in their network (Burt, 1991; Knoke & Burt, 1983) and hold more power, influence, and upper-level positions in their work group or organization (Brass & Burkhardt, 1992, 1993; Friedkin, 1993; Ibarra, 1993).

Prominence is one of the most frequently used network metrics (Monge & Eisenberg, 1987). It refers to the degree to which an individual can be accessed by others in the network through more direct (i.e., fewer intermediaries) contacts (Johnson, 1993) or the number of linkages necessary to connect the member to all other members in the network (Freeman, 1979). Structural holes emerge when a centralized member is lost and the nonre- dundant ties unique to the central member are not replaced. Coworkers and subordinates relying on this member in a predownsizing environment may have difficulties obtaining work-related information and guidance after a downsizing if a suitable replacement is not available. Difficulties in task and social relationships created by downsizing can result in perceptions of chaos and uncertainty among layoff survivors. Prominence can be assessed in various ways through communication network data (Burt, 1991; Knoke & Burt, 1983). As presented in Table 1, Burt (1991) described five: (a) choice status, (b) extensive relations, (c) exclusive relations, (d) power, and (e) percentage of power reflected.

CHOICE STATUS

As a general indicator of prominence, choice status indicates the number of members who have contact with the employee divided by the total number of network members (excluding isolates). This measure ranges from zero to one, with low scores indicating minimal network contact (Burt, 1991).

Choice status is limited to “space boundaries” used in network analysis (Monge & Contractor, 1987). As such, in networks researchers may elect to limit or extend analyses to capture specific network properties. For example, linkages can be described in terms of member “reachability” (i.e., relationships defined until a distance of three indirect contacts is surpassed or only direct contacts are considered). Limited or extended boundaries affect choice status because the total number of members who can reach one another will change as a function of the boundary set (Monge & Contractor, 1987). Similar to the “number of contacts” score in structural autonomy, choice status describes the extent to which the employee is connected to others in the network. Choice status differs from number of contacts because it is based on the number of members who can contact the member as opposed to the actual number of contacts. As choice status decreases for an employee, the possibility for the formation of structural holes increases, since the employee is being contacted by fewer network members.

EXTENSIVE RELATIONS

Extensive relations measures the degree to which a member has a large number of cohesive relations with others in the network. Scores vary from zero, indicating no relations, to one, indicating an extensive base of contacts (Burt, 1991). Low extensive relations scores indicate the presence of structural holes. In other words, employees with a low extensive relations score have fewer contacts. Less extensive network relations increase the chances of experiencing structural holes.

EXCLUSIVE RELATIONS

This measure indicates the extent to which a member is the object of unshared relations from other members in the network. Exclusive relations reveal the time and effort allocated by others to interact with the member (Burt, 1991). Exclusivity in relationships implies that the network members deem the relationships valuable and maintain the relations at the cost of other relationships. Exclusive relationships are similar to nonredundant relationships in that both provide unique information or resources. Downsizing can affect the number of exclusive relationships in a member's network. Scores on this measure vary from zero, indicating no exclusive relations, to one, indicating a high level of relations (Burt, 1991). As exclusive relations decrease for a member, more structural holes emerge.

POWER

Burt (1991) defines power as the extent to which a member is connected to other influential members in the network. For example, a divisional manager is influential in a network because members connected to the manager can benefit from the manager's power. Power scores range from zero, for a network isolate, to one, representing the actor receiving the most relations from powerful others (Burt, 1991). As network members lose powerful contacts through downsizing, they lose access to the information and resources from those contacts and experience an increased number of structural holes.

PERCENTAGE OF POWER REFLECTED

Percentage of power reflected measures the extent to which a network member returns messages received from others (Burt, 1991). This indicator considers the extent to which relationship exchanges are equally reciprocated. Powerful actors do not tend to evenly exchange relationships with less powerful actors (Johnson, 1993). As the percentage of power reflected decreases for employees, they are likely to lose access to powerful others and experience structural holes.

In sum, indicators of prominence primarily address vertical relationships in terms of informal status, whereas structural autonomy indicators address horizontal relationships (Burt, 1991). Prominence and structural autonomy provide distinct yet complementary descriptions of structural holes in network relationships as organizational change shapes both horizontal and vertical work relationships. Combined, the complementary characteristics of structural autonomy and prominence can provide a broader assessment of structural holes in a network.

Downsizing's Impact on Structural Holes

Organizational downsizing is a common organizational practice that has received much attention over the past decade and a half (Uchitelle & Klienfield, 1996). In its wake, downsizing produces unemployment, underemployment, and disruptions to organizational processes.

Downsizing requires layoff survivors to reconfigure their patterns of communication and work processes to adapt to the modified organizational structure. Furthermore, resulting coworker loss and “survivor guilt” greatly affect surviving workers’ functioning and attitudes in the postdownsizing environment (Gutknecht & Keys, 1993). Experts estimate that organizations will continue to use downsizing as a tool to remain competitive in a fast-changing marketplace (Bruton, Keels, & Shook, 1996; Gottlieb & Conkling, 1995).

In relatively stable communication networks, there is little fluctuation in the configuration of relationships (Johnson, 1993). Previous studies of structural holes measure network configurations under stable conditions and demonstrate that structural holes create advantages or disadvantages for organizational members (Burt, 1992a, 1992b). Although the investigation of organizational networks under stable conditions is informative, organizations often operate under continually changing conditions (Levy & Merry, 1986). Any fluctuation to an organizational network can create changes in the configuration and location of structural holes in that network. Under normal organizational conditions, network members adjust to minor fluctuations in their network due to promotions and turnover by forging new links and/or solidifying existing relationships. In other words, network members, at their own will, open and close structural holes to create advantageous situations and maximize their network resources. However, under downsizing conditions, employees have little influence over the distribution of their relationships as structural holes open and close with the loss of personnel and the reassignment of responsibilities.

To date, little is known about the relationship between downsizing and organizational networks or how structural holes resulting from downsizing affect the surviving network members. A natural setting to observe the effects of changing structural hole configurations is during an organizational downsizing. A network prior to a downsizing could be considered stable or routine, whereas the network following the downsizing would be considered unstable. Downsizing represents an extreme test of structural holes and an examination of their nomological validity. An extreme test is consistent with McGuire's (1983) concept of contextual knowledge, implying it is valuable to test concepts in a range of settings. Consequently, as a first step in this investigation, we ask the following:

RQl: What structural autonomy and prominence elements contribute to a measure of employees' structural hole experiences under pre- and postdownsizing conditions?

RQ2: How do organizational members' structural hole experiences change as a result of downsizing?

Structural Holes and Chaos

Downsizing creates observable voids in organizational networks. Perceptions of chaos are a likely consequence of downsizing as work-related problems, surprises, and unpredictable situations emerge with the loss of coworkers. Layoff survivors may also have new superiors, coworkers, and subordinates as well as new work roles and work locations. However, structural holes may also uniquely contribute to perceptions of organizational chaos. Employees experiencing structural holes due to the loss of key information sources are likely to feel caught off guard by managerial decisions and not understand the rationale for the actions of their units or other units. Increases in structural holes following a downsizing may continue over months to exacerbate disconnected employees' perceptions of disorganization until their network contacts are replaced.

Given employees' unique set of network relationships, changes in structural holes may also differentially affect each member's perception of chaos. Although employees lose access to valued information sources, they can gain a connection to an employee who settles their nerves by providing key information. In this case, network changes may not result in increased perceptions of chaos. If a downsizing increased employees' structural hole experiences and left them more isolated, but preserved their vital redundant contacts, employees may perceive rationality and order as their readily identifiable "group" remained intact. While individual structural hole experiences will be unique, we predict that, overall, employees experiencing structural holes will be positively related to their perceptions of organizational chaos.

Structural Holes and Openness to Change

Survivors' responses to an organizational intervention can have a considerable impact on unit productivity (Gutknecht & Keys, 1993; Whetten & Cameron, 1994). Employees may resist interventions by slowing their work pace, "going through the motions" of implementing a new policy, or promoting animosity against the leaders of the change effort. In some cases, organizational changes lead valued employees to seek employment elsewhere. Employees may advance an intervention's intended outcomes by exerting themselves to achieve goals or trusting in management's decision to alter operations or work patterns.

Employees' support for or hostility toward an intervention largely depends on how the intervention affects them. Prior research indicates that downsizing does not affect employees uniformly (Freeman & Cameron, 1993). Some employees may report that a downsizing improved their work situation in terms of reducing complexity or bureaucracy (Cameron, Freeman, & Mishra, 1991) while devastating others' work settings (Cascio, 1993). Structural hole experiences may explain the variability in survivors' openness to participate in postdownsizing changes. For instance, layoff survivors who lose resources through an increase in structural holes are unlikely to support change- related initiatives. In contrast, layoff survivors who gain resources as structural holes close in their network are likely to embrace change-related initiatives. These patterns are likely to continue over time. Employees increasingly isolated by structural holes may become embittered and see little benefit in supporting an organization that increases the difficulty of their work and limits their resources. Yet, the experience of closing structural holes after one of the most feared and unpleasant organizational events may embed a belief that management knows what they are doing and their postdownsizing initiatives should be supported. Thus, we predict the following:

H1: Increases in layoff survivors' structural hole experiences are positively related to their perceptions of chaos and negatively related to their willingness to participate in change. Decreases in structural hole experiences are negatively related to survivor's perceptions of chaos but positively related to their openness to participate in change.

H1a: Two months after the downsizing, increases in structural hole experiences are associated with increases in survivors' perceptions of chaos and decreases in their willingness to participate in change.

H1b: Increases in structural hole experiences immediately following the downsizing will continue to positively affect survivors' perceptions of chaos but negatively affect their willingness to participate in change 5 months following the downsizing.

Method

Procedure

Employee’s communication network relationships and attitudes were measured 60 days prior to (T_1) and 60 (T_2) and 150 (T_3) days following an organizational downsizing. At all three data collection points, subjects completed surveys measuring communication structure. Subjects’general attitudes were assessed at T_2 and T_3. Due to the nature of reporting communication network relationships, strict anonymity was not possible for the participants. However, participants were assured strict confidentiality in their responses and were guaranteed that their names, or the name of their company, would not appear under any circumstances on any report generated from the data.

Participants

Ninety-seven employees from a large international hospitality company’s corporate office could be described as approximately 57% male and 43% female, between the ages of 20 and 57 (M = 33), and working for the company an average of 4.5 years. At all three data collection points, participants represented accounting, finance, marketing, rooms, engineering, administration, and personnel units.[2]

Measurement

Network relationships. This study measured the distribution of each participant’s work-related contacts (Johnson, 1993; Monge & Contractor, 1987). Participants were provided with an alphabetized directory of all employees listed by functional unit, based on information provided by the participating organization. By the request of the organization, the participants were asked to report formal work relationships only by indicating which organizational members they had spoken with dining the course of a normal work week. The administrative decision to seek "formal communication relationships only" can exclude naturally occurring relationships that are not easily classified as a single type of communication (Burt & Schott, 1985). Although informal work relationships are important in coping with a postdownsizing environment, the organization believed that the downsizing would make participants reluctant to report nonjob relevant relationships and influence their responses in data collections. Due to the exploratory nature of this investigation, a trade-off was made to keep the participants' report of relationships simple at the dyadic level with the hopes of revealing more complex relationships at the organizational level (Burt & Schott, 1985). We were also concerned with minimizing participants' response burden over multiple data collections (Marsden, 1990).

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A linkage was defined as any reported connection between two network members. In these analyses, the prerequisite of reciprocity among relationships was not required (e.g., a relationship did not have to be bidirectional to be recorded as a connection between two members) to ensure the full range of relationships for the prominence calculations. Only the direct linkages of each participant were used in the analyses, since they represent the best indicators of structural holes. Direct linkages were defined as a direct connection reported between two network members, which was not mediated by other connections. Structure 4.2 (Burt, 1991) network analysis program determined the communication patterns in the network at T_1, T_2, and T_3 data collection periods with 97 participants. Specifically, Burt's (1991) structural autonomy and prominence measures from Structure 4.2 were used to summarize the distribution of opportunity and constraint across individual relationships in the network.[3, 4]

Computation of the index. To prepare the network analysis output for subsequent analyses, Structure 4.2 output, which appeared in decimal form, was initially multiplied by a constant to convert it to integer form. Only the nonredundant tie output did not require this conversion. These transformations allowed the data for each structural hole indicator to be combined and contrasted on a standard metric. Following the integer conversion of the network output, a *z* score was calculated for each autonomy and prominence item, per subject, for use in subsequent statistical analyses. For purposes of interpretation, four indicators (i.e., nonredundant contacts, contact efficiency, extensive ties, and exclusive ties) hypothesized to be negatively related to structural holes were reverse coded. Items that passed the tests of confirmatory factor analysis were combined into the index. Each retained structural hole item was assumed, a priori, to have equal weight in the index.

Survey measures. Survey measures evaluated subjects' perceptions of organizational chaos and openness to organizational change during the post downsizing collection periods only (T_2 and T_3). Participants were asked to indicate their level of agreement with each scale item on a 5-point metric {strongly agree, agree, neutral, disagree, and strongly disagree). Confirmatory factor analysis tests of internal consistency and parallelism (Hunter & Gerbing, 1982) were conducted on the organizational chaos and openness to change scales at T_2 and T_3. Factor analysis tests met the requirements that (a) less than 5% of items exceed their confidence interval and (b) chi-square tests on the sum of squares error for internal consistency and parallelism be nonsignificant. The final factor structure retained at T_2 was applied and tested at T_3. Items dropped at any one time period were automatically excluded from the other time period. Final item factor loadings and scale reliabilities are reported in Table 2.

Organizational chaos was measured by a 10-item scale that assessed respondents' perception of the state of their work environment. As a consequence of factor analyses, the retained organizational chaos measure consisting of nine items was internally consistent and exhibited nonsignificant sum of squares errors (χ^2 [36] = 2.56, p > .05 and χ^2 [36] = 4.09, p > .05 at T_2 and T_3, respectively). A high numerical response (i.e., 5) on the chaos scale indicated a high level of chaos. Employees' openness to participate in change was measured with an eight-item scale (Miller, Johnson, & Grau, 1994) that assessed participants' willingness to participate in a planned change. The retained openness measure consisted of seven items. The sum of squares errors for openness were nonsignificant (χ^2 [21] = 3.45, p > .05 and χ^2 [21] = 6.45, p > .05 at T_2 and T_3, respectively). A high numerical response (i.e., 5) on this scale indicated a high level of openness to participate in change.

Analyses

The measurement model for the structural hole index was analyzed using confirmatory factor analysis (Hamilton & Hunter, 1988; Hunter & Gerbing, 1982). Tb assess changes in survivors' structural hole experiences, change scores were calculated for T_1 to T_2 and T_2 to T_3 to generate groupings of survivors' experienced increases versus decreases in structural holes. A repeated measures multiple analysis of variance (MANOVA) tested for mean differences in structural hole experiences.

The relationship of the structural hole indicators to chaos and openness over time were tested through multiple regression after checking correlations for specific error. In addition, the individual relationships of structural hole items and the structural hole index were compared to the dependent variables to assess if the combined index demonstrated greater predictive validity to specified outcomes than the single-item indicators (Cronbach & Meehl, 1955; Schwab, 1980). Tb examine the interdependence of observations among the network and attitudinal self-report measures and to ensure that the autonomy and prominence index items were independent of each other, the following precautions were taken: (a) the Durbin-Watson d was calculated to examine the correlations among the variables' error terms (residuals; Bowerman & O'Connell, 1990);[5] (b) the partial correlations of each structural hole indicator were examined to determine individual item contribution to the index; and (c) the index itself was put to a test of parallelism, which treats interdependence by producing a unidimensional scale as opposed to using individual items that may be multicolinear in character (Johnson, Meyer, Berkowitz, Ethington, & Miller, 1997).

Results

Structural Hole Index

The first research question asked which elements contributed to a measure of employees' structural hole experiences. Pearson product-moment correlations of the structural hole indicators are reported in Table 3. As presented in Table 4, the results of confirmatory factor analyses of the structural hole index revealed that four items fit the requirement of internal consistency and produced a reliable index at all three time periods. A factor solution was first calculated on the T_2 data, which were believed to be the most unstable (i.e., 2 months following the downsizing). The retained four items were nonredundant contacts, constraint, extensive ties, and exclusive ties. The Reliability (Cronbach, 1951) of the retained scale was .94 at each time period. The retained prominence indicators (extensive and exclusive relations) exhibited sound psychometric properties when combined with the structural autonomy indicators (constraint and nonredundant ties). These indicators were consistently and strongly correlated in each of the three time periods, and the error produced in comparison to the predicted inter-item correlations was within the expected confidence interval limits at $p < .05$ (Hunter & Gerbing, 1982).

The retained four items exhibited properties of internal consistency and met the criteria of parallelism specified by Hunter and Gerbing (1982) in each of the three time periods. The sum of squares errors for the structural hole index were nonsignificant (χ^2 [6] = 0.41, $p > .05$, χ^2 [6] = 0.30, $p > .05$, and χ^2 [10] = 0.31, $p > .05$ at T_1, T_2, and T_3, respectively). The sum of squares errors for tests of parallelism of the structural hole scale, chaos, and openness were also nonsignificant (χ^2 [127] = 36.02, $p > .05$, χ^2 [127] = 32.33, $p > .05$, and χ^2 [127] = 47.73, $p > .05$ at T_1, T_2, and T_3, respectively).[6]

Change in Structural Hole Experiences

The second research question asked how survivors' structural hole experiences changed as a result of downsizing. According to the structural hole index's test-retest correlations (see Table 5), survivors' structural hole experiences were very stable between T_2 and T_3 ($r = .97$). With correlations, it was difficult to determine how structural hole experiences varied between T_2 -T_1 and T_3-T_2. Consequently, employees were divided into subgroups based on their structural hole experiences over time. Accordingly, change scores were computed to identify the direction of change in their structural hole experiences. Four subgroups were identified: (a) survivors experiencing increases in structural holes at both postdownsizing periods ($n = 24$), (b) survivors experiencing increases between T_1 and T_2 but decreases between T_2 and T_3 ($n = 25$), (c) survivors experiencing decreases between T_1 and T_2 but increases between T_2 and T_3 ($n = 20$), and (d) survivors experiencing decreases in both post downsizing periods ($n = 16$).[7] Figure 1 displays the distribution of structural hole changes.

An examination of structural hole mean scores for each period by subgroups in Table 6 indicated remarkable differences in the patterns of structural hole experiences (negative scores indicate fewer structural holes, and positive scores indicate more structural holes). Results of a 1 x 4 repeated measures MANOVA revealed significant differences in survivors' structural hole scores over time due to their subgroup affiliation, $F(3, 160) = 17.71$, $p < .0001$, $R^2 = .64$).

Predicting Chaos and Openness to Change

The hypothesized relationships between employees' structural hole experiences and their post downsizing reactions were tested through multiple regression with (a) the summated structural hole index and (b) the individual structural hole indicators (simultaneously entered) on chaos and openness at $_{T2}$ and $_{T3}$ in case individual structural autonomy and prominence indicators had better nomological validity. Variable means, standard deviations, and correlations of the structural hole index with chaos and openness are reported in Table 5. Regression analyses and tests of independence for both the individual indicators and the combined index with chaos and openness to participate in change as the dependent variables are reported in Table 7 and Table 8, respectively.

As indicated in Table 7, the structural hole index was a modest predictor of chaos with standardized regression coefficients (p) ranging from .16 to .28, suggesting that those experiencing structural holes were likely to experience chaos. Whereas the T_2 static relationship between structural holes and chaos was nonsignificant, the static relationship at T_3 was significant in addition to the lagged relationship between structural hole experiences at T_2 and perception of chaos at T_3. In some cases, individual indicators produced a slightly higher R^2 and multiple correlation coefficient than the index. In each of the regression equations with the individual indicators, several of the partial correlations did not differ from zero, indicating a spurious relationship with chaos. Although multicolinearity was evident in each time period, with strong correlations among individual scale items (Bowerman & O'Connell, 1990), the Durbin-Watson tests of independence suggested that the resulting error terms were not significantly correlated and supported the use of the combined index to predict perceptions of chaos.

The results of the regression analyses indicated that experiences of structural holes were negatively related to survivors' openness to participate in change, with multiple correlation coefficients ranging from –.04 to -–24. Whereas the T_2 static relationship between structural holes and openness to participate in change was nonsignificant, the static relationship at T_3 was significant. The lagged relationship between structural hole experiences at $_{T2}$ and openness to participate in change at T_3 was also significant. As noted earlier, in some cases the individual items produced a slightly higher R^2 and multiple correlation coefficient than the index, but the items displayed independence as indicated by tests of the Durbin-Watson *d* statistic.

Whereas the structural hole index was consistently related to chaos and openness at T_2 and T_3, a considerable shift occurred in employee attitudes between T_2 and T_3. Following the downsizing at T_2, employees perceived a moderate level of chaos (M = 3.19) and were not open to participate in changes (M = 2.79). At T_3, survivors' responses reversed in direction (chaos M = 2.14; openness M = 4.02). Results of paired comparison *t*-tests indicated significant differences in employee T_2 and T_3 chaos and openness scores (t [91] = -6.35, p = .0001 and t [93] = 6.81, p = .0001, respectively).

Post Hoc Analyses

As indicated above, considerable differences existed over time in survivors' structural hole experiences, perceptions of organizational chaos, and their openness to change. Two post hoc analyses were conducted to assess survivors' unique experiences. First, scatter plots of the data were produced by separating participants' structural hole experiences into three subgroups (low, moderate, and high) in each time period. Low structural hole experiences were defined as less than 0, moderate structural hole experiences were defined as being from 0 to .5, and high structural hole experiences were defined as greater than .5. Results indicated several unique patterns according to their experiences. Survivors experiencing moderate levels of structural holes at $_{T3}$ perceived higher levels of chaos at T_3. In comparison, those experiencing high or low levels of structural holes at T_3 did not report high levels of chaos and appeared more apt to cope with network changes. In fact, survivors experiencing high levels of structural holes at T_3 displayed a parabolic relationship with chaos at T_3. As their structural holes increased, eventually their report of chaos decreased. Survivors experiencing moderate and high levels of structural holes at T_2 were less open to change at T_3, suggesting that those most affected by structural holes after the downsizing are the least accepting of change.

Second, survivors' responses were divided into four groups on the basis of their experiencing increases or decreases in structural holes over time (see Table 6). For those with increases in structural holes across T_2 - T_1 and T_3 -T_2, their structural hole experiences were positively correlated with chaos and negatively related to openness to change at both T_2 and T_3. These patterns were consistent for both static and lagged comparisons.

For survivors who initially showed increases but then decreases in structural holes, their structural hole experiences at T_2 were positively related to openness to change at T_2. Subsequent network changes had an equivocal impact on perceptions of chaos and openness to change at T_3. Among employees who initially showed decreases but then increases in structural holes, structural hole experiences were positively related to openness at T_2 but negatively related to openness to change at T_3. Although the initial closing of structural holes was positively received, the later increase in structural holes undermined employees' willingness to participate in change.

For survivors with decreases in structural holes at both time periods, their structural hole experiences at T_2 and T_3 were positively related to openness to change at T_3, whereas the opposite relationship existed at T_2 (i.e., more chaos and less openness). In short, post hoc analyses revealed that (a) survivors experiencing consistent increases in structural holes viewed the organization to be in disarray and were not receptive to plans by management, (b) survivors experiencing consistent decreases in structural holes after several months became open to changes, and (c) survivors whose structural hole experiences reversed between T_2 and T_3 accordingly reversed their attitudes about the downsizing by T_3.

Discussion

Perhaps no other single event such as a downsizing tells dismissed and surviving employees alike that they are disposable. The wisdom of downsizing is openly questioned in the popular press. Downsizing devastates employee morale and trust in management and leads to the absence of demonstrated improvements in earnings or stock market performance (Koretz, 1997). Few downsizing efforts generate their desired organizational outcomes (Cameron, in press; Cascio, 1993; Whetten & Cameron, 1994) and as much as 75% of downsizings may leave the organization in worse shape than before (Keidel, 1994). This study offers insights into the negative as well as positive effects of downsizing by focusing on the opening and closing of structural holes in employee networks. The results of this study indicate that a combined index can measure employees' structural hole experiences before and after a downsizing, and, although structural holes at T_2 are positively related to their perceptions of organizational chaos and negatively related to their willingness to participate in the change, the impact of structural holes varies dramatically given the pattern of survivors' structural hole experiences. The following section discusses the implications of these findings for organizations and downsizing survivors.

Structural Holes Before and Following Downsizing

Whereas earlier research on structural holes examined a limited number of the structural autonomy indicators, the complementary relationship between structural autonomy (nonredundant contacts, constraint) and prominence (extensive ties, exclusive ties) items in this investigation suggests that changes in organizational networks are associated with access to network information and resources (i.e., structural autonomy) and with influence and power (i.e., prominence). The structural hole index produced a continuum ranging from the experience of "no holes" to "many holes" and provided more precise insight into the effects of downsizing by examining employees' network experiences. As structural holes form and close dining organizational change processes, the index gauges these changes. Thus, analyses of structural holes may be particularly useful in examining communication relationships during periods of convergence and reorientation during organizational change (Freeman & Cameron, 1993; Tushman & Romanelli, 1985).

A structural hole index that combines prominence and autonomy measures represents an important extension of the conceptualization and measurement of structural holes within organizations. Future investigations can assess the presence and impact of structural holes and changes to communication networks at the individual level, among intact work units, within departments, or throughout the organization. For example, downsizing is usually evaluated in terms of financial net gain for the organization, economic loss for the community, and the physical and psychological consequences to laid-off and surviving employees (Kozlowski et al., 1993). Yet, measurements like the structural hole index may enable researchers and/or managers to identify (a) critical links in the network that should be preserved and (b) potential trouble spots where structural holes are rampant and additional support is vital for individual, group, or departmental functioning. In short, structural hole indexes that combine structural autonomy and prominence indicators can advance the study of structural holes by providing a tangible connection between network structure and individual responses (i.e., the integration of macro- and microlevel analyses) in organizational communication research (Hartman & Johnson, 1989, 1990; Indik, 1965; Krackhardt & Porter, 1985, 1986; Monge & Eisenberg, 1987).

The index also addresses problems that result from multicolinearity and interdependence with individual structural autonomy and prominence items and provides an alternative to the quadratic assignment procedure (QAP) (e.g., Hubert & Schultz, 1976; Krackhardt & Porter, 1986) for handling nonindependence in network analysis indicators. The QAP examines patterns of similarity among networks and uses all dyadic information present in each matrix (Krackhardt & Porter, 1986). Although the QAP and structural hole index both deal with the problem of multicolinearity, they should be applied as analyses dictate. The QAP is most appropriate for comparisons with data from several different networks. In this investigation, all calculations were produced from binary data (from the same network) that indicated either the existence or absence of a relationship between each network member. Although each of the structural hole indicators is unique in its calculation, each is somewhat dependent on the other indicators. Thus, it is important in future research to assess the linear dependence of network indicators and their relationship to attitudinal or behavioral measures.

The Impact of Structural Holes on Employee Responses

Downsizings do not affect employees equally. As revealed through the structural hole analyses, some downsized employees are disadvantaged due to a loss of information contacts and resources, whereas others improve their position in the network and gain from the change. These shifts in networks can have serious ramifications for employees who may be emotionally strained by survivor guilt or distrust in the organization. Even if employees' network situations improved due to a downsizing, why should they support management’s imposed changes when they may be the next to be released? Or, how will their work relationships change again when management discovers that the desired postdownsizing outcomes are not going to be realized? It is in light of these constraints and questions that the patterns of survivors’ structural hole experiences become important for interpreting the impact of a downsizing.

For employees who experienced increases in structural holes at $_{T2}$ and $_{T3}$, their structural holes experiences were consistently related to seeing the organization in chaos and to resisting changes in the workplace. In many ways, layoff survivors fitting this category may be the most disadvantaged by the downsizing. As structural holes continue to form in their network, they become increasingly detached from others. In a sparse network, employees must rely on a few (and most likely similar) others for information and resources. Thus, they have less means by which to sort through discordant information that could contribute to their perception of the organization being chaotic. By becoming increasingly less powerful in their network as well as losing contacts, they see fewer benefits from supporting organizational changes.

In contrast, employees who experienced decreases in structural holes at T_2 and T_3 theoretically benefited the most from the downsizing. However, the lagged effect in their openness to change may reflect the width of their network contacts as well as the harshness of a downsizing. On one hand, experiencing a closing of structural holes may have placed these employees in greater contact with others who were feeling greater isolation and loss from the downsizing. Given that job attitudes are in part shaped by interactions with others (Salancik & Pfeffer, 1978), interactions with less fortunate others shaped the attitudes of employees experiencing decreases in structural holes. Only later did they realize the benefits of losing structural holes and improve their willingness to participate in organizational changes. On the other hand, downsizing has such a negative effect on employees' emotions that there is a threshold of information or trust that has to be overcome before employees begin to see changes to their network position in a positive light.

For employees with reversals in structural hole experiences, their attitudes about the change mirrored their structural hole increases or decreases. However, numerous questions arise from their boomerang experience. For instance, what are the long-term consequences for those who experienced decreases and then increases in structural holes? It is possible that these survivors over the next year will be the least trusting of management and the least inclined to build long-term relationships with their coworkers, since they know that relationships can quickly change. The initial decrease in structural holes and subsequent increase also raises concerns about their network position. Even though they initially benefited (in terms of closing structural holes) from the downsizing, what aspects of their job or network position led them to become vulnerable in a generally stable network period (i.e., $T_3 - T_2$)? Related questions can be asked of employees who initially experienced structural hole increases and then experienced decreases. In this case, it would be valuable to know if structural holes decreased due to being sought by other organizational members, a change in job responsibilities, or their own efforts to become more connected to their network. Consequently, research exploring shifts in employees' structural holes may provide critical information regarding the impact of downsizing on employee networks and employees' roles in closing or opening structural holes.

Limitations

Network samples are difficult to obtain due to the complex and personal nature of data collection, and represent participants' self-reports of their organizational network interaction (Monge & Contractor, 1987). In this study, the participating organization desired that the participants report only formal work relationships. It was presumed that downsizing would affect formal work relationships more severely and workers would be reluctant to report informal relationships that were not related to their work roles. However, in any network, both formal and informal relationships drive employee behavior and attitudes. Thus, formal relationships may be an underrepresentation of employees' network interaction because informal ties also provide valuable resources not always available from formal ties. Recent investigations of network relationships and their impact among organizational members differentiate structural hole influences (which are based on the information access and control benefits it provides) from Philos or Simmelian influences (which are based on social facilitation, connection, and trust among a network group) (Krackhardt, 1992, 1995; Sparrowe & Liden, 1997). Given that network relationships may serve varying purposes, future investigations should test for differences in structural influences due to formal and informal relationships and examine how survivors' reactions to downsizing differ along formal and informal lines. Researchers should also attempt to gather larger samples of networks undergoing downsizing to further explore the many tentative conclusions drawn from this study.

Several of the autonomy and prominence measures were excluded from this study. The exclusion was necessary given the limits inherent in the collection and analysis of binary network data. Information related to oligopoly was not available from the participants through the data collection, and the interconnectedness and density of relationships within the resulting network sample limited the possible analyses. It may be the case that the excluded structural autonomy and prominence items suggest other relevant network applications or that the excluded items were indicators of other network phenomena. For instance, the excluded items may be indicators of macro phenomena not addressed in this research (cf. Burt, 1992b). To further explore micro- and macrobased relationships in organizations, the application of the excluded items may be warranted in future research on structural holes in networks.

Regarding the study's design, Williams and Podsakoff (1989) recommended that longitudinal data should be collected at intervals accurately representing the issues under study. In this particular investigation, decisions about the timing and frequency of the data collection sought to accommodate the needs of the participating organization (60 days prior to and 60 and 150 days following the downsizing). It is possible that the relationship between structural holes, chaos, and openness may have fluctuated more widely at intervals not measured immediately following the downsizing. Future investigations of this type should consider smaller time frames, with more frequent collection periods. As Johnson (1985) asserted, researchers receive little guidance on the gradual or evolutionary nature of change between variables that create difficulties in selecting sample frames. With these potential difficulties in mind, each field investigation, with its own unique needs and limits, should be carefully addressed in the research design.

Conclusion

Although plans for downsizing and its implementation may stem from a primarily financial focus, it is clear that downsizing affects the communication relationships of surviving network members by opening and closing structural holes in its wake. Given the importance of employee responses to planned organizational interventions, paying attention to structural hole developments may well serve those who plan organizational change. In the case of downsizing, the impact of increases and decreases in structural hole experiences on employee responses is complex and should be followed carefully.

Notes

1. An earlier version of this article was presented at the 82nd Annual Conference of the Speech Communication Association, San Diego, California, 1996. The authors would like to thank Franklin J. Boster, Georgia T. Chao, Ronald F. Cichy, Marshall Scott Poole, and the anonymous reviewers and editors for their suggestions on earlier versions of this manuscript.
2. The sample at T_1 consisted of 130 participants; the 97 participants at T_2 and T_3 are the layoff survivors. Only the responses from the 97 survivors at all three time periods were included in the analyses.
3. In the measurement of structural holes, it is believed that the use of direct network linkages represents the most effective means to assess network members' encounters of structural holes. When using indirect linkages, there is no way to determine what is being transferred through the relationship. Indirect linkages commonly involve gatekeeping, blocking, filtering, and innuendo that are less inherently present in direct linkages. As a result of organizational change, the confounding characteristics of indirect linkages may be exaggerated. Furthermore, employees' experiences of structural holes are primarily based on their direct contacts rather than more distant contacts. When expanding the measurement of structural holes to include Burt's (1991) prominence indicators, direct linkages were used to remain consistent with the measures of structural autonomy that were applied.
4. The indicators of choice status, power, and percentage of power reflected could not be accurately represented from the use of direct linkages only and were excluded from the index. The number of contacts was not included in the index because of its lack of

differentiation between redundant and nonredundant contacts. The measure of proportional density was also excluded from the index because the binary network data collected here restricted the range of the responses and produced precisely the same output as for network density. Finally, the measure of oligopoly could not be calculated without additional survey data not available from the participants at the times of collection and was excluded from the index. Thus, the final test of the structural hole index was based on the remaining network indicators: nonredundant contacts, constraint, network density, contact efficiency, hierarchy, extensive relations, and exclusive relations.

5. The Durbin-Watson *d* tests the null hypothesis that the error terms (residuals) are not positively correlated. If the d statistic exceeds the critical value (for N= 97 and k - 1), one does not reject the null suggesting that the error terms are not correlated. This test is based on the assumption that the error terms are normally distributed.
6. To conduct the tests of parallelism with the T_1 structural hole index, the measures of chaos and openness were used from T_2 due to the fact that chaos and openness data were not collected prior to the downsizing at T_1.
7. Nine subjects were excluded from the correlational analyses because they experienced no change at $T_2 - T_1$ and/or $T_3 - T_2$.

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Table 1. A Description of Structural Autonomy and Prominence Items.

	Description	Range of Values	Relationship to Structural Holes
Structural autonomy items			
Contacts	The number of members connected to an individual, consisting of both redundant and nonredundant ties	1 to *N*-1	Negative
Nonredundant contacts	Represent nonduplicated, unique sources of information or resources obtained through other network members	1 to *N*-1	Negative
Contact efficiency	The number of nonredundant ties divided by the number of total contacts, indicating what proportion of a member's contacts are nonredundant	0 to 1	Negative
Proportional density	Reports the extent to which contact pairs are directly connected to each other	0 to 1	Positive
Network density	Reports the "strength" surrounding the relationships of contact pairs	0 to 1	Positive
Constraint	Indicates to what extent a member's interaction is dependent on a few members	0 to 1	Positive
Oligopoly	Refers to a member's ability to substitute one set of contacts for another that is less constrained	0 to 1	Negative
Hierarchy	Represents the distribution of constraint present across all network relations	0 to 1	Positive
Prominence items			
Choice status	Indicates the number of members who have contact with a member divided by the total number of network members who could have contacted them	0 to 1	Negative
Extensive ties	Indicates the degree to which a member receives a large number of cohesive relations from other members in the network	0 to 1	Negative
Exclusive ties	Represents the extent to which a member is the object of unshared relations from other members in the network	0 to 1	Negative
Power	Indicates the degree to which a member is connected to other influential members in the network	0 to 1	Negative
Percent power	The extent to which a member returns interaction received from others	0 to 100%	Negative

Table 2. Factor Loadings and Reliabilities for Chaos and Openness at Time 2 and Time 3.

	a	Time 2	α	Time 3
Chaos	.98		.97	
1. I am frequently encountering problems that I did not experience prior to the recent downsizing.		.96		.81
2. I am having to handle surprising or unpredictable situations that I did not have to handle previously.		.96		.89
3. I am almost never sure what is going to happen at work.		.94		.88
4. I find that unexpected things frequently occur at work.		.96		.89
5. Compared to work prior to the recent downsizing, it is business as usual.[a]		.86		.69
6. I feel like my work problems are always getting out of hand.		.89		.92
7. I would describe my work environment as chaotic.		.89		.92
8. A sense of order and structure has disappeared from my job.		.87		.91
9. Many of my coworkers feel that no one is steering the ship.		.78		.92
Openness	.97		.91	
1. I would consider myself "open" to the changes the recent downsizing brought to my work role.		.90		.64
2. Right now, I am somewhat resistant to the changes in my work role.[a]		.88		.82
4. I am quite reluctant to consider changing the way I now do my work.[a]		.73		.58
5. I think the implementation of the recent downsizing positively effects how I accomplish my work.		.92		.67
6. From my perspective, the recent downsizing was for the better.		.95		.89
7. The changes as a result of the downsizing are for the worst in accomplishing my work.[a]		.94		.92
8. The changes as a result of the downsizing negatively effect how I perform my work role.[a]		.92		.93

a. These items were reverse coded.

Table 3. Means, Standard Deviations, and Correlations of the Individual Structural Hole Items at T_1, T_2, and T_3.

Variable		*M*	*SD*	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	T1 Constraint	0.00	1.59							
(2)	T1 Hierarchy	0.06	1.27	0.15						
(3)	T1 Nonredundant	0.00	0.31	0.79	0.25					
(4)	T1 Network density	0.00	0.54	0.58	0.37	0.53				
(5)	T1 Contact efficiency	0.00	0.61	0.42	0.35	0.43	0.96			
(6)	T1 Extensive ties	0.00	0.30	0.73	0.08	0.84	0.11	-0.02		
(7)	T1 Exclusive ties	-0.01	0.40	0.66	0.28	0.85	0.38	0.27	0.83	
(8)	T2 Constraint	-0.02	1.12	0.76	0.04	0.63	0.48	0.38	0.58	0.50
(9)	T2 Hierarchy	0.00	1.05	0.03	0.37	0.15	0.12	0.09	0.10	0.25
(10)	T2 Nonredundant	0.00	0.30	0.55	0.12	0.77	0.37	0.31	0.64	0.59
(11)	T2 Network density	0.00	0.50	0.44	0.31	0.47	0.79	0.76	0.12	0.31
(12)	T2 Contact efficiency	0.00	0.60	0.29	0.31	0.39	0.74	0.79	-0.01	0.20
(13)	T2 Extensive ties	0.00	0.24	0.61	0.00	0.70	0.12	0.02	0.82	0.63
(14)	T2 Exclusive ties	0.00	0.25	0.43	0.16	0.65	0.24	0.16	0.64	0.68
(15)	T3 Constraint	-0.02	1.03	0.79	0.06	0.63	0.49	0.37	0.57	0.49
(16)	T3 Hierarchy	0.00	1.12	0.01	0.40	0.16	0.11	0.09	0.09	0.27
(17)	T3 Nonredundant	0.00	0.30	0.55	0.12	0.77	0.37	0.31	0.64	0.59
(18)	T3 Network density	0.00	0.51	0.45	0.28	0.49	0.78	0.75	0.14	0.33
(19)	T3 Contact efficiency	0.00	0.62	0.30	0.28	0.40	0.75	0.77	0.01	0.23
(20)	T3 Extensive ties	0.00	0.22	0.62	0.00	0.68	0.12	0.02	0.79	0.58
(21)	T3 Exclusive ties	0.00	0.25	0.44	0.17	0.62	0.21	0.13	0.62	0.64

(con't)

(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
0.18													
0.78	0.25												
0.68	0.26	0.62											
0.51	0.22	0.53	0.94										
0.76	0.19	0.88	0.31	0.16									
0.65	0.42	0.86	0.44	0.30	0.87								
0.94	0.22	0.74	0.65	0.47	0.74	0.62							
0.17	0.89	0.24	0.27	0.25	0.17	0.41	0.21						
0.78	0.25	1.00	0.62	0.53	0.88	0.86	0.74	0.24					
0.66	0.26	0.62	0.96	0.91	0.33	0.45	0.69	0.28	0.62				
0.50	0.21	0.54	0.92	0.94	0.19	0.34	0.51	0.24	0.54	0.97			
0.76	0.15	0.87	0.32	0.17	0.98	0.82	0.76	0.18	0.87	0.35	0.20		
0.64	0.39	0.84	0.43	0.29	0.84	0.95	0.65	0.45	0.84	0.47	0.35	0.86	

Note. *N* = 97. Correlations above .23 are significant at the *p* < .01 level, and *z*-score means different from zero on variables 1-21 are due to rounding error.

Table 4. Factor Loadings and Reliabilities for the Structural Hole Index at T_1, T_2, and T_3.

Indicator	T1	T2	T3
Nonredundant contacts[a]	.79	.78	.78
Constraint	.96	.96	.94
Extensive relations[a]	.91	.95	.96
Exclusive relations[a]	.88	.89	.88

Note. Cronbach's alpha = .94 for T_1, T_2, and T_3. Contact efficiency, network density, and hierarchy were excluded from the index.
a. ***These items were reverse coded.***

Table 5. Scale Correlations, Means, and Standard Deviations for the Final Factors at T_1, T_2 and T_3.

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. T_1 Structural hole index	.00	.62							
2. T_2 Structural hole index	−.01	.46	.76						
3. T_3 Structural hole index	.00	.43	.77	.97					
4. T_2 Chaos	2.81	1.27	.27	.14	.13				
5. T_2 Openness	3.21	1.35	−.18	−.03	−.02	−.88			
6. T_3 Chaos	3.86	.92	.29	.28	.25	.03	.09		
7. T_3 Openness	1.98	.96	−.27	−.25	−.23	.05	−.13	−.86	

Note: $N = 97$. Correlations above .24 are significant at the $p < .01$ level, and z score means different than zero on variables 1, 2, and 3 are due to rounding error.

Table 6. Means, Standard Deviations, and Correlations Among Participants in the Four Subgroups.

	M	*SD*	1	2	3	4	5	6	7
Increase-increase ($n = 23$)									
1. T_1 Structural hole index	–.60	.52							
2. T_2 Structural hole index	–.32	.40	.92						
3. T_3 Structural hole index	–.27	.39	.92	.99					
4. T_2 Chaos	3.52	1.29	.37	.49	.49				
5. T_2 Openness to change	2.49	1.27	–.25	–.36	–.37	–.90			
6. T_3 Chaos	2.58	1.19	.43	.36	.33	.03	.16		
7. T_3 Openness to change	3.58	1.21	–.45	–.32	–.31	–.07	–.11	–.89	
Increase-decrease ($n = 25$)									
1. T_1 Structural hole index	–.02	.33							
2. T_2 Structural hole index	.17	.29	.90						
3. T_3 Structural hole index	.08	.28	.87	.94					
4. T_2 Chaos	3.28	1.22	–.22	–.14	–.17				
5. T_2 Openness to change	2.63	1.19	.23	.20	.28	–.86			
6. T_3 Chaos	2.01	.86	–.08	.12	.14	–.18	.29		
7. T_3 Openness to change	4.16	1.00	.11	–.02	–.06	.27	–.34	–.90	
Decrease-increase ($n = 20$)									
1. T_1 Structural hole index	.34	.54							
2. T_2 Structural hole index	–.05	.43	.60						
3. T_3 Structural hole index	.05	.43	.55	.96					
4. T_2 Chaos	2.71	1.11	–.15	–.04	–.18				
5. T_2 Openness to change	3.31	1.31	.01	.27	.34	–.83			
6. T_3 Chaos	2.06	.72	.07	.17	.12	.12	.09		
7. T_3 Openness to change	4.06	.69	–.21	–.34	–.29	–.15	.05	–.81	
Decrease-decrease ($n = 16$)									
1. T_1 Structural hole index	.45	.53							
2. T_2 Structural hole index	.22	.54	.82						
3. T_3 Structural hole index	.17	.54	.83	.99					
4. T_2 Chaos	3.15	1.44	.38	.15	.14				
5. T_2 Openness to change	2.75	1.64	–.28	–.14	–.12	–.94			
6. T_3 Chaos	1.83	.62	–.10	–.09	–.08	.07	–.13		
7. T_3 Openness to change	4.16	.66	.34	.28	.29	.38	–.27	–.51	

Table 7. Comparisons of the Individual Autonomy and Prominence Items to the Structural Hole Index

Independent Variable	Multiple R for Equation	R^2 for Equation	Adjusted R^2	F Value Significance	r	Partial β	Durbin-Watson d	d Significance
				Dependent variable = T_2 Chaos				
Equation	.36	.13	.09	.02			1.86	$p < .01$
T_1 Exclusive ties					.02	.05		
T_1 Constraint					.05	.08		
T_1 Extensive ties					.24	.48		
T_1 Nonredundant					−.13	−.29		
T_1 Structural hole index	.23	.05	.04	.03		.23	1.72	$p < .01$
Equation	.30	.09	.06	.07			1.90	$p < .01$
T_2 Exclusive ties					−.08	−.20		
T_2 Constraint					−.05	−.08		
T_2 Extensive ties					.27	.68		
T_2 Nonredundant					−.10	−.23		
T2 Structural hole index	.17	.03	.02	.14		.16	1.76	$p < .01$
				Dependent variable = T_3 Chaos				
Equation	.41	.17	.13	.002			1.85	$p < .01$
T_1 Exclusive ties					.08	.17		
T_1 Constraint					−.15	−.23		
T_1 Extensive ties					.06	.12		
T_1 Nonredundant					.14	.32		
T_1 Structural hole index	.24	.06	.05	.02		.24	1.89	$p < .01$
Equation	.33	.11	.07	.03			1.77	$p < .01$
T_2 Exclusive ties					.07	.14		
T_2 Constraint					−.01	−.02		
T_2 Extensive ties					−.03	−.08		
T_2 Nonredundant					.12	−.29		
T_2 Structural hole index	.28	.08	.07	.00		.28	1.86	$p < .01$
Equation	.33	.11	.07	.03			1.75	$p < .01$
T_3 Exclusive ties					−.01	−.22		
T_3 Constraint					−.04	−.06		
T_3 Extensive ties					−.04	−.10		
T_3 Nonredundant					.22	.47		
T_3 Structural hole index	.25	.07	.06	.01		.25	1.80	$p < .01$

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Note. N = 97.

Table 8. Comparisons of the Individual Autonomy and Prominence Items to the Structural Hole Index

Independent *Variable*	Multiple R for Equation	R^2 for Equation	Adjusted R^2	F Value Significance	r	Partial β	Durbin-Watson d	d Significance
				Dependent variable = T_2 Openness				
Equation	.34	.12	.08	.02			2.31	$p < .01$
T_1 Exclusive ties					−.04	−.07		
T_1 Constraint					−.07	−.10		
T_1 Extensive ties					−.27	−.53		
T_1 Nonredundant					.21	.49		
T_1 Structural hole index	.15	.02	.01	.16		−.15		$p < .01$
Equation	.27	.07	.03	.14			2.31	$p < .01$
T_2 Exclusive ties					.07	.16		
T_2 Constraint					.08	.13		
T_2 Extensive ties					−.26	−.65		
T_2 Nonredundant					.13	.32		
T_2 Structural hole index	.04	.00	−.009	.72		−.04		$p < .01$
				Dependent variable = T_3 Openness				
Equation	.38	.14	.11	.01			1.77	$p < .01$
T_1 Exclusive ties					−.08	−.16		
T_1 Constraint					.14	.21		
T_1 Extensive ties					−.01	−.02		
T_1 Nonredundant					−.16	−.37		
T_1 Structural hole index	.22	.05	.04	.03		−.22		$p < .01$
Equation	.29	.09	.05	.08			1.73	$p < .01$
T_2 Exclusive ties					−.03	−.06		
T_2 Constraint					.01	.02		
T_2 Extensive ties					.06	.15		
T_2 Nonredundant					−.16	−.39		
T_2 Structural hole index	.24	.06	.05	.02		−.24		$p < .01$
Equation	.31	.10	.06	.05			1.70	$p < .01$
T_3 Exclusive ties					.05	.10		
T_3 Constraint					.00	.01		
T_3 Extensive ties					.08	.20		
T_3 Nonredundant					−.25	−.54		
T_3 Structural hole index	.22	.05	.05	.03		−.22		$p < .01$

Note. N = 97.

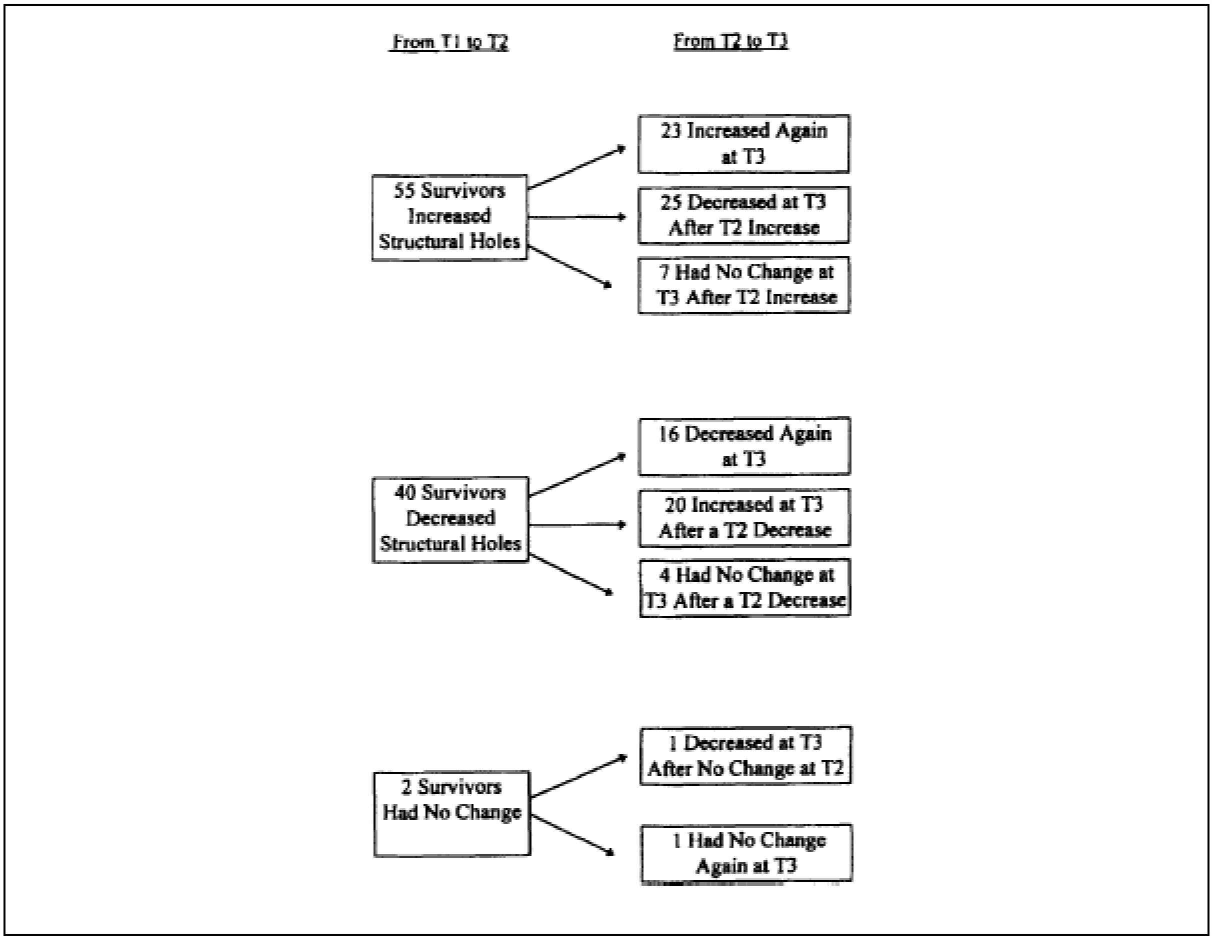

Figure 1. Display of Changes in Downsizing Survivors' Structural Hole Experiences Over Time