# The Health Effects of Downsizing in the Nuclear Industry:

# Findings at the Los Alamos National Laboratory

## Final Report

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# I. INTRODUCTION

- **Changing global economies require research on effects.**

In 1992 the Soviet Union dissolved and the Cold War ended. Consequently, the United States' military strategy and budget shifted. The Department of Energy (DOE) and the nuclear defense industry in the United States embarked on a process of changing its mission and determining revised, necessary staffing levels. In October 1992, Section 3161 of the National Defense Authorization Act for Fiscal Year 1993 was passed and outlined an approach to workforce layoffs in the nuclear weapons industry.

Anticipating major layoffs, the DOE and Centers for Disease Control (CDC) identified a key research priority: to study the impact of the expected downsizing and other organizational changes on both the remaining workforce and on those who lost their jobs. Boston University School of Public Health, with funding from The National Institute of Occupational Safety and Health (NIOSH), was selected to study the health and organizational impacts of workforce reductions. The goals were to: 1) understand those factors that mitigate or exacerbate the consequences of restructuring and downsizing; and 2) propose measures to prevent adverse consequences of downsizing.

This report explains our research methodologies as well as the findings at the Los Alamos National Laboratory (LANL), one of the five study sites. We discuss the significance of the findings and recommend ways to make all of the sites safer and healthier workplaces.

Downsizing and restructuring are two prominent manifestations of the continually changing global economic landscape. Business and government lack complete information about the economic, health and organizational impacts of downsizing. Our study contributes important data that can help ensure that decisions are made with more complete knowledge of how organizational restructuring will affect individuals and the workplace.

- **Study investigates impact of layoffs on health factors.**

Five study sites that best represented a variety of downsizing experiences were selected from a pool of 18 DOE defense sites: the Los Alamos National Laboratory (LANL), the Idaho National Engineering and Environmental Laboratory (INEEL), the Nevada Test Site (NTS), the Pantex Plant, and the Y-12 Plant at Oak Ridge. These sites also featured variation on other characteristics including size, location, the state of the regional economy, and percent of employees unionized. Data gathering included: interviews, workplace observations, employee discussion groups, an employee survey distributed to more than 40% of the site employees (over 10,500 people), and historical record review.

The study hypotheses are:

1. Downsizing will have a negative effect on individual health and workplace functioning (i.e., employee morale, work performance and job security).

2. Employees are less likely to experience negative health effects and organizations are more apt to function normally the fairer the downsizing process and the fewer direct elements of downsizing employees experience.
3. During periods of organizational change, one's work and work environment, including job strain[1], organizational style[2], co-worker and supervisor support, and workplace safety will affect both individual health and workplace functioning.
4. Workplace factors including job strain, organizational climate[3], and the employee's perception of the fairness of the downsizing process can moderate the impact of downsizing on health and organizational outcomes.

We analyze data for each site, focusing on the impact of downsizing, job strain and organizational climate measures on physical health, mental health and organizational functioning. We examine downsizing as a work stressor and analyze how individual, organizational and systemic factors influence health.

- **Our study finds association between downsizing process, workplace factors and health.**

The principal statistical findings for the surviving employees at the Los Alamos National Laboratory follow.

1. The rate of downsizing and the rate of voluntary layoffs at LANL were each only statistically associated with one of the study outcomes.
2. The more fair employees rated the downsizing process, the fewer negative health and work functioning impacts they experienced including fewer medical symptoms and conditions, less survivor syndrome symptoms and greater job security.
3. The more direct elements of the downsizing an employee experienced (from being laid off and rehired to distributing layoff notices to having one's job restructured), the more negative health and work functioning impacts were seen, including more medical symptoms and conditions, lower overall mental health (MCS score), greater survivor syndrome, more perceived stress and more job insecurity.

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[1] Job strain is a concept that encompasses the physical and psychological demands a worker experiences and the control that employee has over work tasks. Control at work is defined as the ability to structure work as well as the extent to which a job is challenging and one's skills are used. Job strain is measured using three scales: the job demands scale, the decision authority scale and the skill discretion scale. See items B1 and B6 in the attached survey (Appendix F).

[2] Organizational style refers to several aspects of managerial and leadership approaches, with particular attention to how relationships and problems are handled. We chose four scales related to organizational style to assess how the company / organization handles or experiences conflict resolution, the relationship with the DOE, communication, and workplace violence.

[3] We use organizational climate as an umbrella term covering elements of the work environment. We include the components of organizational style listed above (four scales) as well as co-worker and supervisor support, and workplace health and safety (three scales measuring general safety, toxic exposure and exposure to noise).

4. Higher job strain was predictive of more medical symptoms reported, a lower mental health score, more survivor syndrome symptoms, greater perceived stress and job insecurity and lower employee morale.
5. Matrixed employees who reported a more negative experience of this job structure also reported significantly more health problems (symptoms and conditions), worse mental health (all three outcomes) and more job insecurity.
6. People of color (non-whites / Latinos) working at LANL reported fewer medical conditions, better mental health (all three outcomes) and fewer instances of poor work performance, although employees expressed that they felt that non-whites were subject to discrimination. LANL was the one site where we found statistically significant differences on the outcomes based on race / ethnicity.
7. The perception of a workplace that is safe and healthy and where no consistent danger of being exposed to dangerous toxins exists is predictive of better overall physical health, fewer medical conditions, a more secure job future, better work performance and higher employee morale but is also associated with a lower overall mental health score.

From our qualitative analyses we learned that employees have many concerns related to management at the site. Employees highlighted: issues of communication, low levels of trust between employees and management and a lack of training in managerial practices. In a site focused on research and managed by an academic institution, there is a belief that non-scientists and subcontractor employees are treated as second class citizens and that scientists promoted to supervisory positions often lack necessary training.

While there had been no recent downsizing, the site was dealing with the aftermath of a 1995 involuntary downsizing event that had been contentious and resulted in law suits still being resolved at the time of our study. Some employees reported a loss of expertise, an increase in paper work and stress manifesting in low employee morale and depression.

Our findings are discussed in detail in this report with references to findings at the other four study sites. This report also includes details about study methodology and site history. The *Five-Site Final Report* contains an overview of findings from this study and examines both individual level health and functioning outcomes and workgroup level outcomes (i.e., sick time usage and accident rates). It also contains important policy implications for the DOE complex.

- **Many people helped to make this study possible.**

This study required enormous cooperation. Our biggest thanks are to the nearly 6,000 employees who participated in focus groups or interviews and completed surveys and to those supervisors who helped make that possible. At LANL, special appreciation is due to our primary contacts for most of the study: Marta Oakley, Nina Epperson, Dave Stoeckle and Michael Garcia. We also thank others who took over the contact roles, made data collection possible and provided contact with employee groups and union members including Shirley Fillas, Loretta Sanchez, Elizabeth Barnett and Rick Blea.

Additionally, many researchers and agencies contributed to this study; they are acknowledged by name at the end of this report.

This report received two levels of external review, including a peer review by two experts in the field of workplace stress and psychosocial research. We accounted for and incorporated their comments in this final report.

# II. CONTEXT AND HISTORY

## IIA. Department of Energy Overview

- **Agency's missions change in response to ending of cold war.**

The Department of Energy (DOE), established as a cabinet-level agency in 1977, combined the functions of its predecessors: the Atomic Energy Commission (AEC), responsible for nuclear weapons development, and the Federal Energy Administration (FEA), created in response to the 1973 oil embargo to guard against energy supply disruptions. The DOE assumed the missions to protect the national security and reduce nuclear danger, enhance long-term energy security by advancing scientific understanding of conventional fuels and alternative energy sources, and develop technologies that contribute to US economic productivity.

With the end of the nuclear arms race and bans on weapons testing, the DOE weapons production mission shifted to one of weapons maintenance and research into longevity of weapons systems. Additionally, the DOE assumed responsibility for environmental stewardship to clean up radioactive and hazardous waste at 15 major locations in 13 states.

The DOE contracts with private corporations to run federally owned defense facilities. At most sites, these contracts lasted for long periods of time (up to 50 years) and were run on a dollar-plus basis. Since 1990, however, more contracts have been competitively bid, and contractors have been under tighter financial limits. Most contracts are now performance-based with no to limited capacity to expand funding in a given year.

The defense industry has always worked under the imperatives of secrecy. Though the ending of the Cold War prompted shifts toward a more open work environment, national security and secrecy continue to be paramount, particularly at the national laboratories and weapons facilities.

## IIB. DOE Downsizing History

In 1992 the Soviet Union dissolved and the Cold War came to an end resulting in dramatic shifts in the United States' military strategy and budget. The DOE and the

nuclear defense industry in the United States embarked on a process of changing its mission and determining necessary staffing levels. While layoffs (referred to as reductions in force or RIFs) had been implemented prior to 1992, the defense industry had generally been one of growth. In October 1992, Section 3161 of the National Defense Authorization Act for Fiscal Year 1993 (attached as Appendix A) was passed and outlined an approach to planning and implementing workforce layoffs consistently across the nuclear weapons complex.

> *Section 3161 also identifies objectives that each plan should address, including: minimizing social and economic impacts; giving workers adequate notice of impending changes; minimizing involuntary separations; offering preference-in-hiring to the extent practicable to those employees involuntarily separated; providing relocation assistance under certain conditions; providing retraining, educational and outplacement assistance; and providing local impact assistance to affected communities* (OWCT, 1998).

- **Task Force established to plan approach to downsizing and to anticipate impacts.**

DOE management and union leaders anticipated that these employment and organizational changes would affect not only employees, but also the communities in which these facilities have been located for decades. In 1993, the DOE established a task force to assess the impacts of these transitions. In September 1994, this task force became the Office of Worker and Community Transition (OWCT). Reporting to the Secretary of Energy, its charge was to plan, implement, and evaluate programs that supported workers and their communities through the downsizing process (which included retraining, placement programs, resale of DOE assets, and programs for survivors).

- **Strategic Alignment Initiative changed missions, budget and workforce size.**

In the fall of 1994 the DOE unveiled the Strategic Alignment Initiative, a planning process that shifted core DOE missions from defense production to environmental management and clean-up of production sites. In addition to the structural and mission changes, the DOE announced budget cuts in December 1994 to reduce operating expenses by $14.1 billion over five years. These announced changes resulted in reductions to the workforce, restructuring of contractor organizations, and the planned closure of certain facilities. Even though the shift from production to environmental management was expected to produce a one-time, major reduction in the workforce, other events and continued budget reductions led to ongoing downsizing in the DOE complex and affected sites differently.

Layoffs continued in 1995 and beyond, driven by budget reductions and the realization that the number of production workers who were retained for environmental remediation exceeded the demand.

DOE prime contractor employment fell 25% over five years (from 140,589 in September 1991 to just over 105,000 in September 1998) and is expected to decrease further.[4] The DOE had the greatest number of employees (148,686) at the end of fiscal Year 1992 (September 1993). Peak employment for the managing and operating (M&O) contractor at each study site was at the end of the following fiscal years: 1989 at LANL, 1988 at NTS, 1991 at INEEL, 1993 for Oak Ridge (Y-12) and 1995 at Pantex. September 1999 employment levels at the five study sites range from 31% to 91% of their highest employment levels (figures from OWCT annual report, Fiscal Year 1998).

Throughout the DOE complex (contractor, not federal employees) there have been approximately 46,000 official Section 3161 layoffs since 1992. Seventy-one percent of these were voluntary separations.[5] The percent of involuntary Section 3161 separations increased from 19% of the total in Fiscal Years 1993-95 to 55% in FY 1998.[6] The five sites in this study downsized 14,018 employees between September 1991 and September 1998[7] (OWCT, 1999). At several sites, including the Y-12 Plant and the Pantex Plant, downsizing has occurred since June 1998.

## IIC. Study Background

- **NIOSH requests research to study impact of downsizing on survivors.**

Little is known about the health effects of downsizing on remaining workers even though some studies, including preliminary research sponsored by the OWCT, have focused on the health, economic, or social consequences on those who are laid off.[8] In 1994, at the time of the Strategic Alignment Initiative, a joint committee of the DOE and CDC determined that it was a research priority to study the impact of the expected downsizing and other organizational changes on the remaining workforce as well as on those who lost their jobs.

To that end, the National Institute of Occupational Safety and Health (NIOSH) released a request for proposals to examine the impacts of workforce reductions on the health of employees who retain their jobs and on their organizations. Boston University School of

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[4] Note: These overall employment levels and downsizing numbers are from the Office of Worker and Community Transition. Later in this report, when we analyze downsizing rates by site or organizational unit, we rely on data received from the contractors, broken down by department (numbers downsized and type of event). For LANL, the raw numbers may appear distinct as OWCT includes only UC employees and includes some out-of-state employees of the Lab not included in our study data.

[5] Voluntary separations include offers for early retirement as well as requests for volunteers (with either an enhanced package or a severance package similar to that given to employees who are laid off involuntarily). In most instances, certain job categories or positions were eligible to take advantage of these voluntary offers and others were not. Not all requests for voluntary layoffs are accepted.

[6] The totals here include voluntary layoffs, early retirements, attrition, and involuntary layoffs.

[7] This figure includes 1,294 employees downsized prior to the start of the 3161 program in Fiscal Year 1993 (October 1992).

[8] In 1995, the OWCT conducted a pilot study and then a broader study of the effectiveness of worker support and training programs and of an individual's success in achieving post-DOE employment plans (retirement, education, part or full-time employment) (Balcombe, 1995).

Public Health was selected to conduct the research. Our study is the first large-scale project measuring the health impact of organizational change on survivors of a downsizing event(s).[9]

The on-going globalization of today's economy has been associated with numerous organizational changes. Business and government tend to champion downsizing as a positive response to global competitiveness. Yet, how well it has transformed companies from less to more competitive is open to discussion with some studies showing that companies that downsize do not subsequently perform above industry averages (Cascio, 1998). Some attention has been directed toward the impact of downsizing on organizational productivity. Only recently have researchers begun to ask specific questions about how organizational change affects employee health (Hurrell, 1998).

- **Boston University School of Public Health investigates results of organizational change.**

Worker insecurity, employee distrust, and decreasing organizational commitment are likely results of the continual organizational change of this era. Focus groups and employee interviews conducted by our group at the DOE facilities have recorded such concerns at each of the study sites. Indeed, these symptoms of organizational change appear to significantly affect employee health and performance. Our study highlights those effects and recommends interventions to modify the way organizations implement change so as to positively impact employee health and organizational functioning.

This study covers the period from 1991 through June 1998. We chose January 1991 as a starting point for data collection as it preceded the post-Cold War downsizing whose parameters were stipulated by Section 3161.

We employed a collaborative approach at these federally connected work sites. It is believed that an outside entity having no official attachment to the downsizing process might have easier access to study participants. At the same time, given the high security environment, it appeared useful and necessary to have government employees assist with negotiating site access and attend some site visits to lend their credentials and affiliation.

[9] The study agreement originally included a component to look at displaced workers. The task was revised: explore with contractors the possibility of accessing rosters of former employees for future potential research. It appears Human Resources departments can create such rosters of displaced employees but there are data challenges including accessing information about employees of prior contractors and access to home addresses.

# III. HYPOTHESES AND BACKGROUND LITERATURE

## IIIA. Description of the Problem and the Model

Some of the impacts on workers who lose their jobs seem obvious: income loss, potential loss of identity, and uncertainty about their future. The purpose of this research, however, is to provide knowledge about the impacts of downsizing and other organizational change on the health of employees who retain their jobs and on organizational functioning. It is imperative that we understand the health effects for workers who remain given the likelihood that employees may be working more, yet will be facing fewer resources, job uncertainty, and changes in roles, required skills and site mission.

- **Research model considers downsizing as key stressor event.**

Few large-scale, epidemiological studies have been carried out to assess health outcomes. However, relevant literature exists on the impacts of work stress on health, job insecurity and health; the organizational consequences of downsizing; and perceptions of justice and fairness in the workplace. Findings from these areas are briefly summarized below with greater detail provided in Appendix B.

The model we tested uses downsizing as the stressor event. Downsizing is measured in four ways including a rate of downsizing, the extent to which it is voluntary, personal experiences of the downsizing, and perceptions of the downsizing process. We examine the links between the stressor event, other contributors to or buffers of stress (including organizational functioning, job characteristics, sociodemographic factors, and individual behaviors and experiences), and stress outcomes for the individual and the organization. Job strain, as defined by Karasek and colleagues (a construct summarizing job demand and job control), is included as a central concept in the field of work organization, stress and health (Karasek, 1979). Both the context and the outcomes in this model are viewed on individual, group, and system levels.

- **Hypotheses guide investigation at five DOE sites.**

We generated four study hypotheses to test at five Department of Energy work sites that had experienced downsizing. The hypotheses are:

1. Downsizing will have a negative effect on individual health and workplace functioning (i.e., employee morale, work performance and job security).
2. Employees are less likely to experience negative health effects and organizations are more apt to function normally the fairer the downsizing process and the fewer direct elements of downsizing the employee experiences.
3. During periods of organizational change, one's work and work environment, including job strain, organizational style, co-worker and supervisor support, and workplace safety will affect both individual health and workplace functioning.

4. Workplace factors including job strain, organizational climate, and the employee's perception of the fairness of the downsizing process can moderate the impact of downsizing on health and organizational outcomes.

## IIIB. Relevant Theories and Areas of Study

### B1. Stress models

This study is grounded in a work stress model. We ask what happens when a stressful event such as downsizing occurs. Although it is popularly recognized and accepted that work stress adversely impacts a workforce, much less agreement exists about what stress is, how to measure it, how it impacts health and what aspects of health are actually affected by it.

Our research examines the environmental causes of stress. Unlike other theorists who studied stress focusing on the individual and the way an individual interacts with the workplace, we examine work processes and climate as well as job characteristics (job strain and others). We study to what extent these influence the health and productivity of individuals in a changing work environment.

### B2. Downsizing literature

Downsizing, or large-scale layoffs, has been adopted over the last decade as a management tool with the purported aim of strengthening a company or agency by reducing budgets and personnel. Sometimes downsizing is associated with a partial or complete restructuring while at other times it is simply a reduction in the number of employees. The literature on downsizing crosses varied disciplines, with the vast majority coming from the fields of business (e.g., organizational management and human resources) and psychology (e.g., organizational development).

- **Previous research also examined effects of downsizing, but with a more limited scope.**

A 1995 study in six industrialized nations found that downsizing had been carried out at more than 90% of the firms studied (Wyatt 1993). This downsizing had been implemented without information about the health impacts on remaining employees and the organizational and productivity costs. Often, corporate executives are rewarded financially after a downsizing event, and stock prices increase. But, these stock increases are often temporary. For instance, stock prices of firms that downsized during the 1980s fell short of industry averages in the 1990s (Pearlstein, 1993). Data indicates that two thirds of companies that downsize will downsize again within a year (Cascio, 1996). These findings about the impact of downsizing bring into question whether downsizing is an effective tool for reducing budgets or for creating a more efficient and competitive organization.

From the field of organizational management, literature documents impacts on productivity, quality, morale and turnover. Within the field of psychology, David Noer

has looked at individual responses to downsizing, and documented what he calls "survivor syndrome" which includes symptoms such as fear, insecurity, frustration and anger, sadness and depression, and sense of unfairness as well as reduced risk-taking and lowered productivity (Noer, 1993).

Researchers have also documented additional organizational effects seen in tandem with survivor syndrome, including decreased job security, organizational commitment, trust among co-workers, and job satisfaction, and increased workplace conflict (Henkoff, 1994; Sommer and Luthans, 1999). Other studies found that the threat of or actual downsizing can lead to deteriorated health, increased work demands and tensions in the workplace (Woodward, et. al., 1999). Writing extensively about fairness, Joel Brockner reports that how employees react to a downsizing event is related to their perceptions of how fair and justified the action was (Brockner, et. al., 1995).

Research has focused either on the impact of downsizing on work factors such as security, productivity and satisfaction, or on the relationship between these work factors and health outcomes. A recently published longitudinal study is one of the first to look at causal pathways and to ask not only how downsizing affects work and home factors and health behaviors, but also how that affects health outcomes (Kivimaki, et. al., 2000). Kivimaki and colleagues demonstrate that downsizing "results in changes in work, social relationships, and health related behaviours" (smoking), and that these changes combined with downsizing contribute to increased rates of long term sickness absence. Sickness absence was two times more likely in job groups that had experienced major (>18%) as compared to minor (<8%) downsizing (Kivimaki, et. al., 2000). The significant changes in work characteristics comparing groups that experienced low, medium and high rates of downsizing are: an increase in physical demands, a decrease in autonomy and skill discretion, lowered participation, and more job insecurity.

- **Boston University study adds to body of research.**

In our study, we used downsizing rate and the rate of voluntary layoffs as independent predictors. Two additional independent variables related to downsizing focus on the process: an index of the ways in which each person experienced the downsizing and perceptions of how fair the downsizing process was. We also used a six-item survivor syndrome scale (developed at NIOSH by Soo Yee Lim) as an outcome variable. The survivor syndrome scale covers many factors that relate to mental health and overall functioning concepts including guilt, sadness, and reduced motivation.

## B3. Justice and fairness

- **Researchers hypothesize that perceptions of fairness can influence health outcomes.**

We posit that perceptions of fairness and justice directly affect health. We also posit that if an employee believes that workplace policies in general or a downsizing event are implemented fairly, then stressful events are less likely to have a negative impact on health. We are particularly interested in investigating two concepts: procedural justice or whether employees believe that policies and procedures are determined and

implemented in a fair and consistent manner; and interactional justice or how employees are treated by supervisors and upper management (Niehoff and Moorman, 1993).

In addition to the work of Brockner and others who have written specifically about the concept of justice and fairness in the context of a downsizing event, a literature is emerging about workers' perceptions of justice and fairness in how decisions are made and implemented. Research to date shows that perceptions of fairness are important in the workplace and should be considered as an independent variable when analyzing organizational functioning and health (Alexander and Ruderman, 1987; Folger, 1987; Fryxell, 1992; and Greenberg, 1990).

In our employee survey we used two scales to measure fairness/justice. The first was about the organization in general and the second (used in the statistical model) focused on the downsizing event. The scale measures perceptions about the extent to which employees perceived that procedures were fairly implemented, people were treated with respect, communication was clear and timely, and the downsizing process was effective.

## IIIC. Importance of this Research

- **Study findings and recommendations can be used to positively affect health outcomes.**

It is clear that downsizing and organizational changes will have critical and varying impacts on employees and organizations. A change process, for example, can produce an excess demand on employees or, on the other hand, a greater sense of control and satisfaction at work. Workforce reductions can either be voluntary (i.e., early retirement, voluntary incentive packages, normal attrition) or involuntary and can be well planned and well communicated or not. Downsizing can be part of a process of organizational restructuring or it can be implemented as a reaction to perceived problems, independent of other organizational assessments. These scenarios are likely to lead to different health and organizational functioning outcomes.

The knowledge sought through this research is important for employees, unions, and other employee organizations, contractors and federal entities managing organizational change in DOE facilities, as well as for those in other industries. Globally, downsizing has become a common management tool and more research is needed to understand the long- and short-term impacts and implications for individuals and companies.

# IV. RESEARCH METHODOLOGY

## IVA. Multiple Study Methods

- **Variety of methods leads to rich understanding.**

We used qualitative and quantitative approaches to collect data to fully understand the experience of downsizing. Quantitative data collection includes structured surveys and archival data. Qualitative methods were particularly important given the exploratory nature of this project and the importance of understanding employee perceptions and the context for recommendations. Qualitative, or ethnographic, data was drawn from the open-ended interviews, focus group discussions, and open-ended survey questions.

Ethnographic data, or descriptive information, which uncovers the patterns of the employee culture, is part of an important research strategy to study questions and populations that may be inaccessible with other research techniques. Ethnographic methods produce data that provides both depth and detail through direct quotation and meticulous description of situations, events, people, interactions, and observed behaviors (Agar, 1980; Spradley, 1979). Interviews with key individuals, work-site observations, and focus group discussions permit the researcher to understand the world as seen by respondents within their everyday settings. Additional information on the importance of using qualitative data is presented in Appendix C.

Quantitative analysis on the other hand, involves the collection, organization, and interpretation of data according to well-defined procedures. Data gathered in this study are used to address questions such as how much, how often, where, and what kind. The data used in quantitative analysis include self-reported data (e.g., survey) as well as 'objective' or archival data (including sick time and accident rates).

Quantitative or statistical methods have at least three goals: 1) data reduction, 2) data inference, and 3) relationship identification. We have used well-recognized and tested scales as part of our analysis, an important feature particularly given that some of the research questions are new. The analytic results, which have a numerical value attached, have a shared meaning and understanding which extends beyond the study's scope. Quantitative methods allowed us to document the experience of many employees across the five study sites in a time-efficient manner, to draw inferences and to use statistical techniques to test our hypotheses.

This multi-method study approach is well suited to the concepts under study as a way to more fully describe the experience of stress and the research setting. Pearlin suggests that to understand and reflect an individual's experience of stress, a study should measure various levels of social functioning including sick-day usage, filing of grievances, accidents, and injuries (Pearlin, 1989).

Additionally, multiple methods are useful to confirm validity and reliability. Triangulation is a process to compare and contrast different sets of data and offers the opportunity to run convergent validity and reliability checks of the data. Denzin defines the process as "the combination of methodologies in the study of the same

phenomenon" (Denzin, 1978,). The assumption is that "multiple and independent measures, if they reach the same conclusions, provide a more complete portrayal of the particular stress responses being studied" (Ivancevic and Matteson, 1988). In the discussion section of this report (Section IX) we identify where qualitative and quantitative results converge and where they provide distinct information.

## IVB. Qualitative Data Collection and Analysis

- **Boston University School of Public Health study begins with carefully planned study methods.**

An overview of our initial data collection is presented in this section. Additional details and an evaluation of the process can be found in Appendix D. The first step in the study was to select Department of Energy sites to include in the study. Downsizing characteristics used to select sites included: the rate of downsizing, the number and content of support programs for surviving and displaced employees, and the level of worker participation in the process. Important organizational considerations included:

- a willingness to allow salaried and non-salaried employees to participate;
- availability of data; and
- management representatives open to an extensive research protocol including surveys and focus groups.

Sites were chosen that had significant inter-site variability for the selection characteristics. Initial data collection and site selection was completed by June 1996.[10]

Site visits were made to collect the preliminary qualitative data. Generally, two to three research personnel attended each site visit and were often accompanied by personnel from NIOSH and/or DOE headquarters. The goals of the visits were to: 1) develop on-site relationships; 2) observe the conditions in the environment that people connect with stress; 3) collect current accounts of stress and downsizing via individual and group interviews; and 4) identify ways of measuring health and performance effects in the historical record. We developed instruments to carry out this research including an interview instrument, record review forms and focus group guidelines.

We used interviews to gather information about the structure of the site; processes and policies related to downsizing, personnel or other issues; data availability; and individual perceptions of downsizing. Some of the interviews were with individuals responsible for data management in offices housing records integral to our study.

We collected sample records to determine the format and availability of records from 1991 through June 1998 as well as policy statements and reports on relevant issues.

[10] The initial five sites were Pantex, Idaho, Nevada, LANL, and Rocky Flats. Subsequently, Rocky Flats was dropped from the study sample (issues of access and site cooperation) and the Y-12 Plant on the Oak Ridge Reservation was added, offering an example of a site with significant downsizing and other organizational changes (split contracts, new contractors, and outsourcing).

We chose focus group research to provide key data for this study. The focus groups provided rich and complex information from a wide variety of employees at each site. The data was used to:

- gain an understanding of each site: history, important issues, and site functioning;
- determine the themes important to include in the employee survey;
- cross check quantitative data and the information that emerged from other data sources; and
- explain or better understand some of the quantitative results.

We conducted focus groups at four of our five sites: LANL, Y-12, INEEL, and Pantex. At the Nevada Test Site, the site visit team held a discussion group with representatives of the Southern Nevada Building Construction and Trades Council (SNBCTC).[11] Details regarding the process for getting a random sample of employees to invite and how the groups were conducted can be found in Appendix E, along with an overview of the group composition.

The discussion groups helped the researchers to learn about common concerns and to understand labor and management perceptions about the changing nature of work. Each group lasted one and one half-hours. The facilitator posed open-ended questions about job demands, control over work, job security, social support, workplace safety and accidents, performance, physical and mental health issues, and downsizing. The groups' discussions were recorded and subsequently transcribed and analyzed for themes.

- **Communication with employees and communities is a priority.**

Because downsizing affects not only employees at a facility but their families and the communities in which they live, we sponsored meetings to offer information about the study to former workers and others in the community. These meetings allowed interested and involved individuals to comment on our study and the research issues. We organized community meetings in four of the study communities including Los Alamos, New Mexico; 15 to 30 people attended each meeting.

The research team established communication as a key priority to maintain throughout the study. The study population is large, consisting of approximately 24,000 potential participants at five study sites. More than 6,000 employees have directly participated in this study. In addition, employees throughout the DOE complex have been affected by downsizing and are interested in study results.

We obtained informed consent from employees involved in an interview, focus group, or who completed the employee survey. In the consent forms, we offered information clearly and succinctly. We made available at each stage of the research a summary of the purpose of site visits, and research updates to be printed in site and local media. We established a study e-mail account and posted information on the World Wide Web.

[11] We did not conduct focus groups at NTS as the initial (and only) site-visit for qualitative data collection was in March 1998, after the employee survey was developed and at the very end of Phase I.

We will present our results at each site and will make available written materials at sites, by request from researchers, and on the Web.

## IVC. Quantitative Data Collection

### C1. The *Boston University Workplace Survey*

- **Survey developed to measure key hypotheses.**

With colleagues at NIOSH, we developed a preliminary model of analysis. We used interviews and focus group discussions and reviews of relevant literature and site documents to identify important themes to include in the employee survey. For each construct that appeared important, we identified scales or individual items that would best measure it, prioritizing those scales that have been used extensively and for which there are population norms. We created a number of questions and scales about downsizing, including a scale to measure the opportunities that might arise during a restructuring process.

We completed our draft survey--the *Boston University Workplace Survey (BUWS)*--in July 1997, pilot-tested the instrument at four sites[12] and revised it based on comments solicited during debriefing sessions. We also solicited comments from site and NIOSH institutional review boards.

The final *Boston University Workplace Survey* is intended to take thirty minutes to complete. The survey is divided into seven sections covering demographic information, job characteristics, health and health behavior information, assessment of organizational change, and organizational climate. A summary of the sections and scales as well as a copy of the survey is contained in Appendix F.

- **Survey protocols ensure confidentiality and random selection.**

While developing the survey instrument, we designed protocols for survey sampling, administration, and data entry and analysis (see Appendix G for more detailed information). Since confidentiality was a primary concern to all we spoke with, researchers developed a system where study numbers were not connected to the names database. Surveys were coded with an anonymous study number as well as for site, contractor, division and sometimes department. This allowed us to account for a person's work unit as one important element in the analysis.

At LANL, our study focused on the employees of the University of California (UC) as well as on employees of two major subcontractors: Protection Technology Los Alamos (PTLA) and Johnson Controls Northern New Mexico (JCNNM). We randomly chose

[12] We pilot-tested the survey instrument at INEEL (7/97), Los Alamos (10/97), NTS (3/98), and Oak Ridge (4/98) with one to two groups of four to 15 employees at each site. Participants were allotted one half-hour to answer questions and then a project staff person solicited feedback, probing on items that might be unclear and asking for opinions about the overall survey and the likelihood that their colleagues would complete it.

3,528 employees (43% of the workforce of the three contractors in Spring 1998) from a database of all employees (except those exempted)[13] and invited them to complete the survey.

LANL has 36 UC divisions ranging in size from 11 to 695 employees with seven divisions (mostly executive level) with fewer than 20 employees. Researchers combined the seven small divisions based on functional and hierarchical similarity into one group for the purpose of sampling. This resulted in a total of 30 sampling units. At PTLA and JCNNM, divisions or departments with fewer than 20 employees were combined for sampling, resulting in four and nine sampling units respectively.

Approximately 40% of employees in each sampling unit were randomly included in the survey sample. Because each contractor uses different organizational nomenclature, we employed the term "level 3" for this sampling unit where level 1 is the individual, level 2 a small work group, and level 3 a larger work group (department at JCNNM and division at UC and PTLA).

Eventually, a total of 32 level 3s were included in the HLM Model for analysis of LANL data. PTLA data was analyzed as only two groups: bargaining unit employees and all others. Employees in the nine JCNNM level 3s groups were not included because we did not have complete organizational data from that subcontractor

Surveys were first mailed to sampled employees in July 1998. One researcher visited the site to encourage participation and was available for questions and to collect completed surveys. A thank you was sent two weeks after the survey to all sampled employees. Employees were asked to return the anonymous survey and a separate postcard with their name to indicate completion of the survey. Two additional reminder mailings were sent to all those who did not return a postcard.

## C2. Collection of archival data

The grant proposal identified the need to collect and analyze organizational data to describe exposure, climate, and outcomes. In addition to downsizing rates, other data sets were used as objective outcome data. Certain information was central to the study hypotheses and was important to understand the quantitative results, such as information on employee assistance programs.

- **Data analysis includes extensive review of records.**

During the first few site visits to Pantex and INEEL, we reviewed many archival records to determine those organizational data sets that would be useful for the study.

[13] Exempt employees were those who: a) pilot tested the survey, b) reviewed the survey for approval or who signed the cover letter, and / or c) served as contractor points of contact.

Unfortunately, records we reviewed[14] had numerous limitations. We established guidelines for final selection of archival data sets, including the availability of summary data by level 3 (to match survey data), records relatively complete in paper or electronic form (1991-98), and consistent data across sites. In total, four data sets were requested of the contractors:

- sick time / paid time off data;[15]
- overtime usage;
- downsizing data; and
- accident and illness data.

We also obtained information on policies, policy changes, and organizational restructuring changes during the study period, to assist us in interpreting the data. In addition to the four data sets, we collected data from Employee Assistance Programs at each site to understand services available to surviving employees. We gathered regional economic indicator data from publicly available sources to understand the regional context but did not use these data in the statistical models. The specific data elements, reason for inclusion, intended use of each data type, formulas for calculating rates, and an evaluation of quantitative data collection are described in Appendix H.

These four data sets were collected by level 3 and the data was stored in a separate database for each contractor by month (or quarter) and year for each level 3. This required extensive organizational research to determine, when possible, how now-defunct organizational units were related to the present day units (level 3).[16] This approach allowed us to relate the organizational outcome data (as the experience of defined groups of individuals within the organization) to the survey (as the experience of the individual as well as groups of individuals within the organization) in order to better understand the impacts of organizational change.

It was not possible to collect all the desired data points at each site for the entire study period and / or by the survey level 3s. At two of the study sites, a new, main contractor assumed site management over halfway through the study period (in 1995 at INEEL and in 1996 at NTS). This meant that prior data, when available, was not analyzable by

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[14] Records reviewed during initial visits included medical records, health claims data, worker compensation claims, sick leave data, safety and regulatory affairs data, employee assistance program data, employee grievances, EEO records, outplacement data, procurement records, human resources data including employment levels and attrition, and downsizing data (reports, numbers, support program information, outplacement program data).

[15] At two sites, sick time is part of a paid leave or paid time off policy. We collected paid time off data when no sick leave information was available. While these raw numbers measure different phenomena, we felt we would be able to utilize the data for within site analyses although not for comparison with other sites.

[16] We started with the level 3s sampled for the survey and worked backwards to track work units that were merged, renamed, or had been discontinued at some point between January 1991 and June 1998. Given that we are studying restructuring, these changes were both ample and anticipated. For work units not currently in existence, we attempted to determine if the unit's function ended or if the unit was moved into another group. If units were merged or renamed, the data was labeled with the code for the current level 3. We used site experts and documentation of organizational restructuring to carry out this task. For level 2s and 3s that we could not trace, the data was retained but coded to level 3 = unknown.

level 3 given the enormous organizational changes that took place during these management transitions. See Appendix I for details regarding data collected and not collected for LANL, any limitations or special data parameters at this site, and for information on the percent of study period data that researchers were able to associate with the level 3s as they existed in 1998.

We measured the independent variables of downsizing rate and rate of voluntary layoffs for the entire study period (or all years for which data was available). We restricted analysis of organizational outcome data (sick time rates and TRC rates) to data from the last 12 study months (July 1997 through June 1998). EAP data were used to describe the mental health programs EAP offer, with special attention to services offered during times of major workforce change. No objective data regarding health care usage or medical symptoms were collected.

# V. SITE DESCRIPTION

## VA. Site Characterization

### A1. Site history

The Los Alamos National Laboratory (LANL) was established in 1943 as Project Y of the Manhattan Engineer District with the infamous responsibility of designing, developing and testing the first atomic bomb. LANL is geographically divided into 49 Technical Areas covering more than 43 square miles of mesas and canyons in northern New Mexico. The University of California Regents (UC) has managed the Laboratory since its inception.

LANL is currently one of the largest multidisciplinary, multi-program laboratories in the world. Its central mission still revolves around applying science and engineering capabilities to problems of national security including the five primary areas of: stockpile stewardship, stockpile management, nuclear materials management, non-proliferation and counter-proliferation work and environmental stewardship. Beyond these programs, LANL conducts extensive research in the biomedical sciences, energy, computational sciences, materials science and other basic research.

- **Study focuses on employees of the lead contractor at LANL and two major subcontractors.**

This study focuses on University of California employees as well as people working for the two largest subcontractors to UC who provide the security, and the maintenance, construction and utility support at LANL: Protection Technology Los Alamos (PTLA)

and Johnson Controls Northern New Mexico (JCNNM) respectively.[17] In June 1998 LANL had roughly 9,200 full-time employees: 6,535 UC employees, 1,203 PTLA employees and 430 JCNNM employees in addition to roughly 1,000 employees working for other subcontractors. The subcontractor workforces are largely unionized. The International Guards Union of America represents PTLA's security force and 13 locals govern 15 bargaining units within JCNNM. UC employees are non-bargaining unit employees. UC employees formed the Employee Advisory Council (EAC) with elected representatives from each work area to establish an employee voice and work with management on key issues. However, some interviewed employees indicated that they did not consider the EAC either to be an independent or effective voice.

## A2. Site selection characteristics

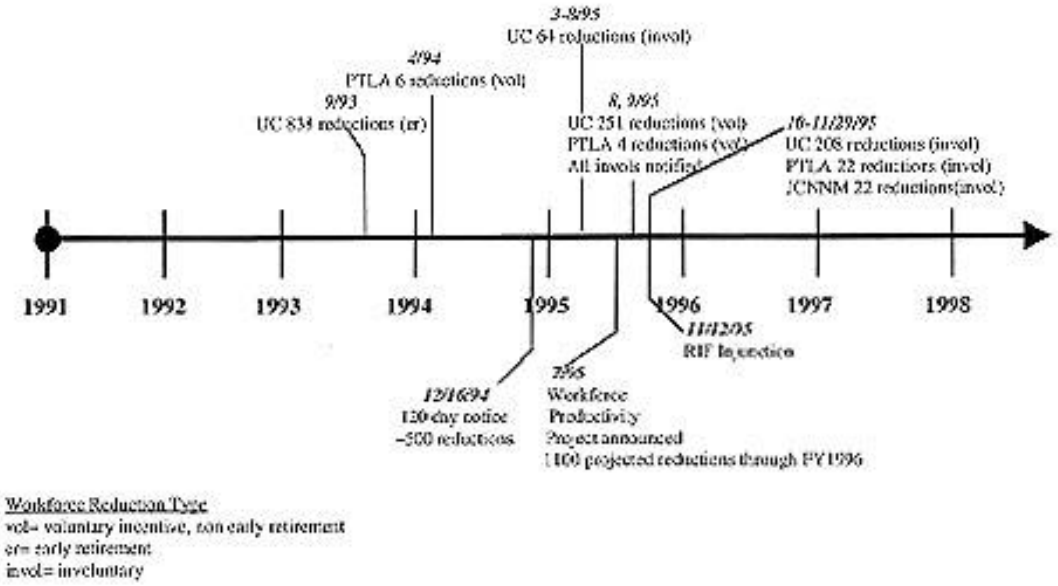
- **LANL's organizational and downsizing history made it important to include.**

Los Alamos National Laboratory was chosen as a study site based on a few select demographic and downsizing characteristics. LANL is a large facility, it is a multi-program laboratory, it is located in a rural setting and the University of California is a primary employer for the region offering the highest pay scale. The downsizing history at this site was important for its inclusion because even though the number of individuals downsized is relatively low, the impact from the downsizing event was extremely high; including a group action lawsuit described in the next section. LANL has had a single managing contractor, the University of California, since its inception and is one of a few DOE sites managed by a university and not a private corporate entity.

The timeline below in Figure 1 illustrates the downsizing events and other major organizational changes experienced at the LANL from January 1991 through June 1998.

[17] LANL is a large site with many subcontractors. We included the two that employ the most employees and are central to site functioning. Other subcontractors not included in the study are The Plus Group (provides secretarial services), General Physics Corporation (provides ES&H technical support) and County of Los Alamos Fire Department (provides fire protection and ambulance services).

**FIGURE 1: Timeline of Downsizing and Restructuring Events at LANL**




## A3. Downsizing and restructuring history

- **Downsizing at LANL begins in 1991 and continues in 1994 with efforts to cut costs.**

Downsizing began at LANL during Fiscal Year 1991. This early downsizing event involved laying off 101 employees. During Fiscal Year 1994, LANL made several efforts, "to reduce costs and to minimize the effects of anticipated reductions in funding for FY1995 and FY1996." Management implemented a major restructuring resulting in a 50% reduction of senior management and a 25% reduction of management throughout the Lab. This was followed by a voluntary early retirement incentive program (VERIP) in which 838 employees participated. Additional efforts to minimize the impact of budget cuts included controlled hiring and employee retraining programs aimed at meeting future needs (consisting primarily of educational reimbursement monies).

On December 16, 1994, DOE announced to LANL employees that funding cuts would require a workforce reduction during FY1995 and that up to 200 UC positions would be affected in addition to 300 subcontractor positions. From March through August 1995, roughly 93 UC employees were issued involuntary RIF notices with the stipulation that they were to be off UC payroll in 60 days if they were unable to relocate to another job within the Lab. Ultimately, 64 employees were terminated. A total of 134 subcontractor employees were also laid off.

- **In 1995 the Laboratory Director announces a new rationale for downsizing.**

On July 7, 1995 LANL director Sig Hecker announced that 200 to 1,100 positions would be cut to decrease support costs and cope with fiscal budget cuts. The Workforce Productivity Project (WPP) was created with the objective to decrease the cost of the

Laboratory's science and technology products by, "…taking unproductive, bureaucratic work out of the system and to reduce overhead costs by eliminating positions no longer required." (do you have a source for this quote?)The ultimate goal was to achieve a ratio of science and technology employees to support employees of 1.3 to 1 (up from 0.94 to 1).

Although the stated goal was to achieve this ratio, it is not clear that the laboratory was consistently able to identify research versus support personnel. Several interviewed employees indicated that some laboratory personnel were confused as to their status. In their opinion, this confusion (whether the individual was a scientist or support) created undue anxiety in this population.

On August 22,1995 a voluntary reduction incentive was offered to UC employees and, simultaneously, Laboratory management announced that involuntary notices would follow at the close of the voluntary window. Only employees working in support functions were eligible for the voluntary separation package (VSP). On September 11, 1995 a total of 251 UC employees took the VSP. Two days later, 256 UC employees were issued involuntary notices and an additional 60 PTLA and JCNNM employees were laid off.

- **Disputes and lawsuits emerge contending that layoffs targeted women and Latinos.**

A contentious backlash from roughly 100 involuntarily separated University of California employees ensued, resulting in a lawsuit that was not resolved until 1998. Separated UC employees contended that the layoffs were conducted in an arbitrary and capricious manner based on subjective performance factors that gave UC managers the opportunity to layoff unwanted workers and disproportionately targeted Hispanic, older and female workers. UC officials firmly believed that they used objective performance measures, as outlined by official RIF guidelines, in determining layoffs.[18] After hearing testimony from both parties, a District Court judge on November 12, 1995 issued a preliminary injunction, temporarily halting the layoff until a full trial could take place. LANL officials appealed the matter to the state Supreme Court, who overturned the injunction. On November 30,1995 175 employees were terminated. Some of the terminated employees filed a group action suit against UC alleging in part that their layoffs were guided by arbitrary and unfair reasons; a settlement was not achieved until May 1998.

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[18] Division and Program Directors first determined the number of positions they needed to cut given budget projections "and other relevant business considerations." Positions were then were grouped so as to compare individuals within a given job series or competency area on: demonstrated job performance, experience and achievement, skills, knowledge and abilities (SKAs) critical to meet current and future objectives and transferability of SKAs. Factors excluded from consideration included all individual characteristics such as age, race, citizenship, sexual orientation and veteran status, and prior history of a grievance against the employer (law suit, whistle blower complaint or administrative review). Five days prior to notification, matrices were to be submitted for each job grouping, indicating how the four criteria were weighted and scored for each individual. Critics of the lay-off found irregularities in the ways groups were established. The Lab conducted a statistical evaluation to monitor for adverse impact and then informed managers. (Information collected from Human Resources personnel and Annual Workforce Restructuring documents.)

Reports show that of the 947 UC and subcontractor employees affected by the 1995 RIFs, 810 were support staff and the remainder science and technology employees. The statistics indicate that women, older workers,[19] and Hispanics were affected in proportions greater than their representation at the site. Including subcontractor personnel, 42.3% of employees in the RIF were of Hispanic origin while they made up about only 28.5% of LANL employees and 40.8% were women who made up approximately 31% of site employees. LANL documents state that the greater impact on Hispanics and women was a function of their over-representation in support functions.

- **UC takes steps to reduce layoffs including job transfers and retraining programs.**

LANL used internal transfers as a primary means of reducing the number of involuntary layoffs. Of the total employees receiving layoff notices in 1995, roughly 20% avoided terminations by finding other job opportunities inside the Lab within the 60-day notice period. It was the Lab's policy to institute transfers for those given layoff notices without a competitive selection process or requiring all qualification requirements to be met, if a reasonable amount of training would fully qualify them to assume the new job. Assistance was provided to organizations accepting RIF employees to reimburse for retraining costs. LANL also set up a preferential rehire program available to anyone who had received an involuntary termination. The program's objective was to mitigate the impact of the FY 1995-1996 RIF. Of the 300 employees involuntarily reduced in FY 1991 or FY 1996, 68 or 23% had been rehired by the Spring of 1997. Of just the employees from the FY 1996 RIF, 56 or 28% were rehired, 37 by UC and 19 by a subcontractor. An audit by Paralax, a consultant group working with the DOE Office of Worker and Community Transition, stated that LANL's rehire statistics are the best in the DOE complex.

Similar to other DOE sites, monetary incentives for the voluntary and involuntary layoffs included severance pay (usually one week of salary per year of service), educational assistance (usually up to $2500 a year for four years), extended medical insurance with the employee paying increasing amounts, and relocation assistance when a terminated employee accepts employment at another DOE contractor facility within two years.

Involuntary reductions of subcontractor employees were mostly bargaining unit employees conducted on the basis of seniority as outlined by specific bargaining unit agreements. Certain subcontractor employees were eligible for separation benefits including full time and regular part-time employees employed at LANL as of September 27, 1991 up until the 120-day workforce restructuring notice. Benefits included outplacement assistance, tuition assistance ($2500 a year for four years), retraining, preference in hiring and relocation assistance. Most of the 39 PTLA employees who were laid off were young cadets and therefore ineligible for the separation benefits. Soon after the RIF, security operations expanded and at least 12 RIFed security officers were rehired. JCNNM was not able to provide information on the number of downsized employees who qualified for separation benefits.

[19] . Interviewee stated that the laboratory's "adverse impact analysis" demonstrated adverse impacts

- **Several forums provided communication and union involvement.**

DOE and LANL developed a list of stakeholders in the workforce reduction process. Stakeholders received announcements about reduction plans, were sent draft versions of the Workforce Reduction Plans (WFRP) for comment, and were invited to community meetings. Union representatives were included on the list of stakeholders. Copies of the WFRP were made available to the public through libraries, study centers, the local DOE reading room and at offices of the related subcontractors.

Community meetings were held at LANL to allow employee input and a second meeting was open to the public. The Workforce Productivity Project set up an online newsletter to provide LANL employees with updates regarding ongoing workforce changes. The newsletter also addressed comments and rumors about the RIF process and other restructuring issues including outsourcing. Process details were also continually published in the Lab's newspaper, *The News Bulletin*.

- **Placement center provides testing and training to displaced workers and survivors.**

UC employees notified of involuntary RIFs were offered outplacement assistance with Right Associates, Inc., a national management consulting firm. RIFed employees were scheduled to attend a two and one half-day workshop regarding job search techniques. In addition to the outplacement assistance workshops, LANL sponsored job fairs and setup a resource center staffed by HR employees containing job postings, regional newspapers, and computers equipped for resume writing and internet job searches. Human Resources and affiliated Division contacts were made available to impacted employees for assistance seeking the appropriate resources concerned with their layoff and subsequent job search. To our knowledge, no retraining programs for current employees have occurred with the exception of offering education reimbursement assistance.

- **Agencies collaborate to provide economic development programs.**

The Regional Development Corporation (RDC) in New Northern, New Mexico coordinates economic development efforts. Their stated mission is to, "organize and implement an economic diversification and development program for north central New Mexico." The RDC assists the region by instituting economic development projects that utilize the workforce from LANL as well as its vacant facilities. To date, economic development projects have focused primarily on building regional infrastructure needs (construction, extension of water lines) and investment in higher education and distance learning capabilities.

- **Restructuring activities and outsourcing are part of the institutional changes at LANL.**

Restructuring activities at LANL have included realigning management structures, eliminating duplication in positions or departments, and employing new business practices. Outsourcing has been investigated on numerous occasions, but clear data on

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based on national origin and age.

the actual extent to which it has been implemented is not available. We did learn however that in June 1995, the food service division was outsourced to a subcontractor. All 23 affected employees were offered employment with the subcontractor. We heard frequently in focus groups about positions that had been UC jobs being offered as contractor positions.

As discussed above, UC has managed LANL since its inception. Prior to 1992, Mason and Hanger managed the security operations for UC. The contractor change to PTLA in 1992 came as a result of a 69-day strike by the security force concerned with poor working conditions and an abusive overtime policy.

## VB. Site Visit and Focus Group Themes

### B1. Site specific findings from interviews and observations

- **Site visits include several methods to collect data.**

The study team conducted three site visits (5/97, 10/97 and 7/98) to LANL. These visits included interviews with union and management, meetings with employees in charge of data of interest, focus group discussions, pilot-testing of the employee survey, workplace observations and a community meeting. We also held meetings with two former-employee groups, a retiree organization and a group of employees who had been laid off during the 1995 RIF. During the first two site visits to LANL, we conducted interviews with 44 people, from a variety of unions and departments (health and safety, human resources, employee grievances, medical services, EAP) at the site. We toured those facilities that did not require special clearance. See Appendix J for details about the site visits.

- **Feelings about the downsizing process linger for years.**

Though the most recent downsizing at Los Alamos National Laboratory was two years prior to our initial site visit, a tempestuous work environment lingered. Employees across organizations painted a picture of a wounded workforce. The LANL workforce in the aftermath of downsizing was described as “cynical,” “distrusting” and “anxiety ridden.” Much of the discontent stemmed from two sources: the procedures used in the downsizing and the changes in organizational structure and functioning resulting from the downsizing.

We heard from many employees that the ratio of support staff to scientific staff used by management, as the basis for the RIF was “bogus,” “misguided” and “unfair.” According to a few employees, the RIF targeted support staff who were not “valued added employees.” One interviewee stated that the RIF basis made an already existing caste system between technical and non-technical staff even more concrete.” Another noted that management categorized the total workforce but did not assess the relationships between support and science and technical staff. The resultant workforce was unbalanced, impacting the normal functioning and productivity of the organization. Many believe the impact could have been avoided with proper planning. One manager argues that the ratio was misunderstood by the employees but agreed it was problematic

because the labeling was inconsistent. Another manager noted that downsizing can never be perfect with people who feel they have lifetime employment entitlement.

- **Findings reveal a variety of employee concerns.**

A reoccurring theme in the interviews was that downsizing resulted in more work for survivors. The resultant work groups were less cohesive due to large workloads and multiple job responsibilities. With fewer employees, a site-wide emphasis has been placed on cross-training employees, streamlining processes and reengineering jobs.

Many anecdotal reports of health disturbances observed in the work environment were revealed. A few of those mentioned most often were: emotional exhaustion, stress, increase in anti-depressant drug (prozac, zoloft and zantec) use and an increase of sick leave usage. Employees also mentioned that the importance of security clearance was a barrier to seeking mental health services. Employees often seek mental health care through their primary care physicians or not at all because they are scared of having a mental health record. After the 1995 RIF, some research was conducted examining domestic violence rates in Los Alamos County and surrounding areas. Preliminary findings showed an elevation in reporting following the RIF but the study was never completed because of a lack of funding and numbers too small to show statistical significance.

Issues facing subcontractor personnel were very different from UC employees. Subcontractor employees repeatedly described being treated as “second class citizens” by UC employees. As one interviewee stated, “There are two kinds of people at LANL, the educated ones and the service ones.” Yet, personnel relations within the subcontractor organizations were very positive. Morale was described as being very high; a change attributed to new management empowering employees and including them in the decision making process.

## B2. Focus groups: methods and themes

- **Data from four focus groups yield important themes.**

A total of 33 employees participated in four focus groups held in October 1997. Three focus groups were held with University of California employees and one group was held with employees of the two subcontractors (PTLA and JCNNM). The focus groups conducted during our first site visit to LANL captured employee concerns related to the workplace and organizational change (e.g., contractor changes, downsizing, outsourcing/ subcontracting, and restart efforts).

We developed a list of concepts from an initial analysis of the focus group transcripts and concepts used in the employee survey. Comments from the focus groups were categorized (coded) in a database by concept and then each concept was described with supporting quotes. Themes were reported by site, followed by a cross-site analysis of themes. A summary of the dominant themes that emerged from the focus groups follows.

UC participants discussed several characteristics about management that contributed to problems within the organization. Management at LANL contains many exceptional scientists rewarded for their work with promotions. According to focus group participants, these individuals are equipped to provide strong technical leadership but often are not able to effectively manage personnel and the organization due to a lack of formal training. Many managers were described as being poor communicators and not active participants in improving the team atmosphere among their employees.

Some employees stated that the organizational climate at LANL is such that managers struggle to institute any change. It is easier and safer for management to be passive with their decision authority as they see their own job security at risk, especially in reference to administrative issues. Frustration was voiced among all focus groups concerning the general practice of ignoring non-productive, poor -performing employees. Rather than dealing with problems directly, UC management was perceived as avoiding the issue by shifting personnel to other groups. Management spoke about fearing potential discrimination claims if personnel issues are confronted.

Trust in management was severely impaired, not only from daily management practices, but also from the process used to downsize the site in 1995. Participants expressed frustration and confusion over management's focus on the ratio of technical to support staff during the downsizing. Some employees believe that UC management saw the downsizing as an opportunity to finally handle performance and personality problems not dealt with in the past, consequently blurring the goal for the downsizing as stated by management. The rehiring that occurred post-downsizing was also confusing to both UC and subcontractor employees as they felt much of the anxiety around the process could have been avoided if people didn't need to be downsized in the first place.

PTLA upper management was seen as being very involved with the workforce by means of an open door policy, being a visible force around the site and actively soliciting employee input. Mid-level managers were not as visible, as information typically flowed from mid-level managers to supervisors who provided information to the workforce. Participants expressed satisfaction with this process.

The search for annual funding, and the dynamics involved with the distribution of funding to different groups was described as a source of stress in the organization. The days of secure funding were said to be over, as UC scientists continually struggle to find funding to finance their research and salaries. Intense rivalries between workgroups for operating funds have created an additional layer of organizational tension. All focus groups were frustrated by the requirement for divisions to spend their annual budget by the end of the fiscal year or lose the remaining funds and risk the possibility of a reduced budget the following year. Employees did not understand why LANL could not operate as industry does, banking excess funds not spent during the fiscal year. Excess, frivolous spending was said to be the norm at the end of a fiscal year. Participants felt that fiscal shortfall and thus layoff concerns could be partially avoided if procurement/budget policies changed.

The absence of a distinct site mission appeared as an underlying anxiety, especially for managers and technical staff. Participants spoke of being in a state of malaise as the DOE and Department of Defense decide how to distribute and prioritize nuclear

stockpile stewardship responsibilities. They questioned the longevity of such a mission and were dissatisfied with not producing a product as LANL did in the past. The viability of other site missions such as the Human Genome Project, were also called into question due to the high cost of doing business with LANL.

Inequity issues appeared to strongly affect the organizational climate at the Laboratory. Technical vs. non-technical, educated vs. non-educated, scientist vs. technical support, Latino vs. Caucasian, contractor vs. subcontractor were all categories comprising inequity concerns. Perceived inequities in pay, benefits, compensation for good work, the opportunity for advancement and layoff decisions diminished some individuals' job satisfaction as they viewed LANL as operating within a strict caste system.

Many employees spoke about increased workload and related frustrations as well as the loss of key skills and experience. Two countering opinions regarding workload and subsequent stress were described. Some employees felt overwhelmed and emphasized the need to prioritize and set limits. Technical staff often expressed concern about the loss of skills and knowledge due to downsizing. As workloads are transferred, a wide experience gap results that can only be lessened by retaining people with this knowledge or retraining employees who remain. Rather than feeling overworked, some employees felt stressed from feeling underutilized and not appreciated for the work that was accomplished.

All focus group participants agreed that safety was of primary importance at LANL. As a result of a few severe accidents at the site, participants stated there was a visible increase in safety awareness among workers. A number of subcontractor employees expressed appreciation for additional safety measures including added documentation and training. However, most UC employees felt that mandated documentation was excessive, creating inefficiencies in work processes.

Some of the themes appear relevant to all of the five DOE sites. Other themes are particular to just LANL or to LANL and one or two other sites. The latter include scientists in management positions, particular concern about future site mission, and issues of discrimination and tensions between prime contractor and subcontractor employees.

Themes important at all or most sites were particularly relevant in developing the employee survey. At several sites, issues of workplace structure including matrixing and outsourcing of work were brought up in focus groups and interviews. Constructs that appear in the survey based on focus group findings include: workload, the presence or absence of a strong mission, the notion of a broken social contract, leadership, communication, and morale.

## VC. Employee Assistance Program

Below is a brief overview of what EAPs offer to survivors as well as common themes expressed at all sites. A summary of the information collected via interview and record

review of the Los Alamos National Laboratory Employee Assistance Program (EAP) is attached as Appendix K.

## C1. Workshops and services

- **Few sites offer targeted training for survivor syndrome.**

Brief therapy and group workshops offered by EAPs at the sites are a valuable resource for employees to help mitigate psychological stresses of work and home life. Based on our interviews, however, we are aware of only a few sites that offered workshops directly addressing themes identified in the literature on "survivor syndrome." Workshops were voluntary and often were not evaluated by participants. In addition, we did not determine whether a sufficient number of workshops were offered. Employees were not as receptive to mandated workshops on change because these were seen as propaganda tools and not helpful.

At LANL EAP services were advertised in the RIF packets employees received encouraging them to use the service if needed for themselves or their families. LANL did approach issues on survivor syndrome on an individual basis as exemplified in an advertisement for the EAP that appeared in the WPP newsletter on February 6, 1996:

> *The Lab is in a time of transition and many employees wonder about their futures from both a career and economic standpoint. Because decisions regarding the Lab's future will take some time to work out, the period of uncertainty could lead some people to experience an excessive amount of stress. If for any reason employees feel they are having a difficult time coping they should make use of the Lab's Employee Assistance Program.*

The LANL EAP director was not at the Lab during the FY 1995, 1996 downsizing and therefore our interview could not shed light on prominent reasons employees came to the EAP during a time of major organizational change. Family and marital problems were the most common presenting problems for other sites.

## C2. Consistencies across sites

- **Employees express tension about layoff notices and reluctance to visit EAP.**

The interviews and questionnaires used to understand the Employee Assistance Programs yielded interesting information. This section reports on themes that emerged as consistent across study sites. At all the sites, employees talked about feeling betrayed by their employer: they had committed to the site and felt that a "social contract" had been broken. A central issue mentioned by EAP staff (and sometimes in employee focus groups as well) was a reluctance by employees to visit the EAP for fear of losing their security clearance. DOE requires many employees to report whether they have consulted a mental health provider or physician about a mental health issue in the last seven years and this can result in certain levels of security clearance being denied.

An interviewee at the Y-12 Plant in Oak Ridge, Tennessee explained: "It's part of a site's legacy. Any veteran employee you talk with knows of someone who was fired after

speaking with the company psychologist." No data is available to validate these claims. It appears as though employees are not sure what needs to be reported, so they avoid the risk by not seeking mental health services. That said, respondents did report that these concerns have diminished in the past few years. A staff person at INEEL felt the issue was no longer central except among some union employees. LANL staff expressed concern that recent espionage charges at the site might exacerbate these employee concerns.

# VI. DATA ANALYSIS PROCESS

## VIA. Employee Level Outcomes

The primary goal of our analysis is to assess the extent to which downsizing affects employee health. Using hierarchical linear modeling techniques, we account for variation in employee health related to employee and job characteristics (e.g., sociodemographic characteristics, psychological job demand) and workgroup characteristics (e.g., leadership, communication, job category). Variables in the statistical analyses are classified as dependent (outcome) variables, independent (predictor) variables, or as co-variates.

Co-variates are assessed for their potential confounding effects as well as main effects on the outcomes. The potential effect-modifying role of some variables is assessed in an analysis of interactive effect as delineated in Hypothesis 4 of the study.

- **Statistical analysis occurs in three phases.**

In the first phase we generated descriptive statistics for all study variables. These include means and standard deviations for continuous variables and relative frequencies for discrete variables. In the second phase we constructed multi-item or derived variables. This process involved assessing scale items using principal components analysis and evaluating internal consistency and reliability of established and newly developed scales using Cronbach's alpha coefficients (a description of each scale and alpha co-efficients can be found in Appendix L). The scores for all composite scales were standardized, on a range of zero to 100, for ease of comparability.[20] In the third phase we developed and evaluated statistical models to address the study objectives.

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[20] Each scale in the analysis has its own scoring calculation and the scales have varying numbers of items (anywhere from one to fourteen) and response categories (usually four or five). To allow for easier comparison, where appropriate, we standardized scale scores on a range of zero to 100. We used the following calculation to transform an individual's score for each scale into a standardized score:

$$\text{standardized score} = \frac{[\text{individual's score} - (\text{minimum possible score})]}{\text{Score range}} \times 100$$

*where the range = maximum possible score - minimum possible score*

- **Researchers pare down the variables and consider them as three conceptual types.**

Prior to determining the final variables in the model, we examined correlations between variables within blocks. If two or more variables were highly correlated (0.4 or greater), we considered only one to include in the multivariable models to minimize collinearity. We also eliminated variables from the model if the alpha coefficient was below 0.6 or if missing data was considered problematic (8% or more of sample not responding). Throughout, we prioritized the co-variates included to avoid overburdening the model with either too many variables or variables for which it was unclear if they functioned as moderators or outcomes. Once we determined a final list of variables, we ran correlations again. Appendix M contains a list of each variable collected, with information about scale scoring and construction, how to interpret a high score and the model(s) in which each was used or why it was excluded from the final models.

The independent variables we used in all final statistical models were downsizing rate and downsizing process. Downsizing process is actually comprised of three scales / indices including an individual's experiences of downsizing, fairness, and the rate of voluntary downsizing.

Co-variates in this model were organized into blocks focusing on the individual, the job and the environment / organization.

1. Individual level co-variate blocks: *sociodemographics/SES, alcohol/tobacco use.*
2. Job level co-variate blocks: *job strain, job characteristics.*
3. Organizational level co-variate blocks: *social support, organizational and management style, safety and health.*

We ran the model separately for each of the nine dependent variables. The dependent or outcome variables are grouped into:

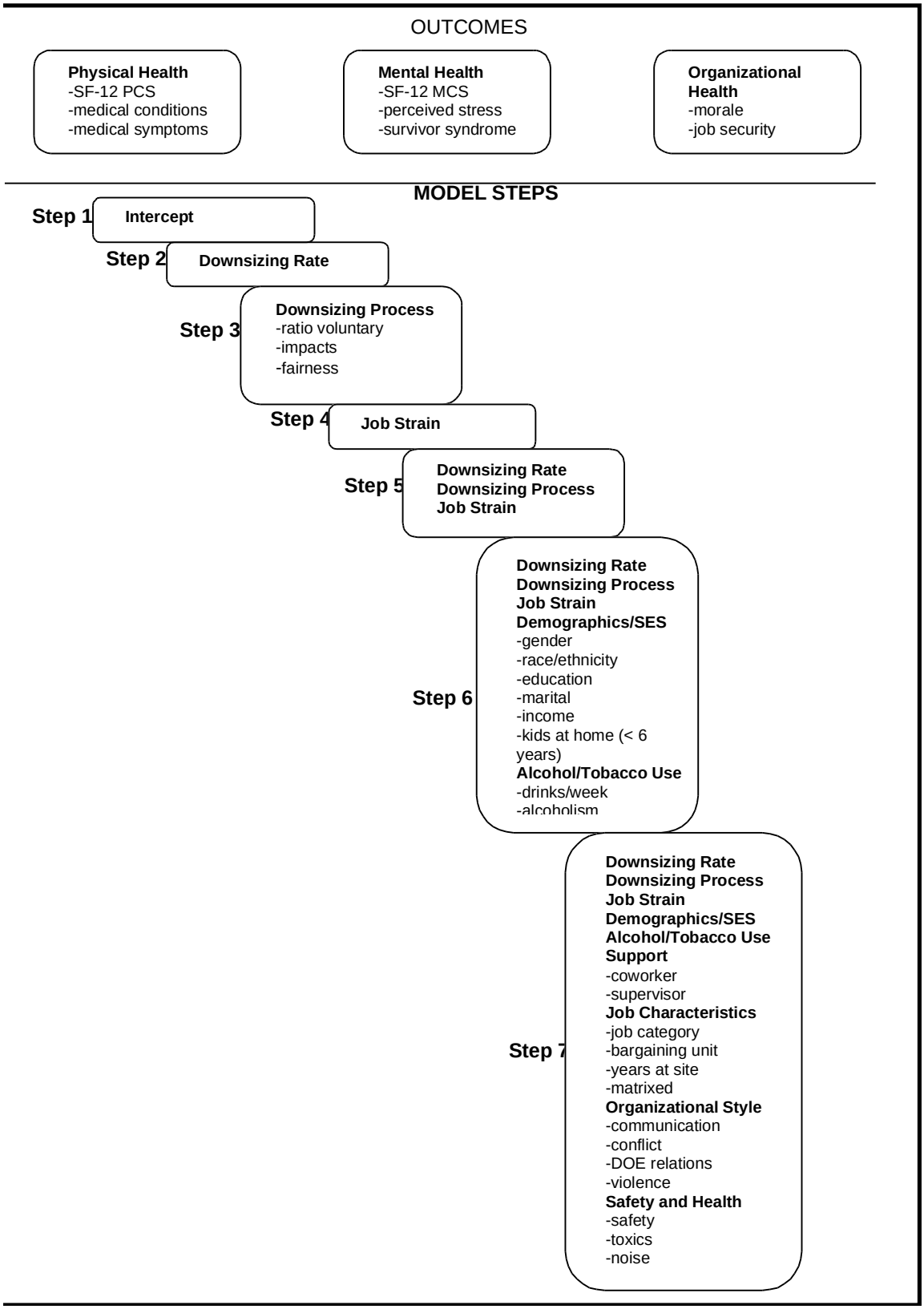
1. physical health outcomes: *physical component scale of the SF-12, medical symptoms and medical conditions;*
2. mental health outcomes: *mental component scale of the SF-12, survivor syndrome and perceived stress; and*
3. outcomes directly related to organizational functioning[21]: *work performance, job security and employee morale.*

- **Statistical model offers a view of how variables function individually and in combination.**

To determine the effect of potential confounders, we used seven steps to analyze data for each outcome. First, we looked at the outcome with no predictors (unconditional means model) which allowed us to examine variability in the mean for each outcome across level 3 organizational units. Then, in steps two and three, we examined each (set of) independent variables alone against the outcome of interest. We looked at job strain alone in step four as it has been extensively studied in this context and, in step five, we combined the variables from steps two through four. All other co-variates (individual, job and environment level variables) were added in steps six and seven. The final hierarchical model is presented in Figure 2, with the variables for each step and the variable block names in bold print.

[21] Two additional organizational outcomes, sick time rate and the rate of total recordable cases (accidents and incidents), are used in the level 3, five-site model and presented in the *Five Site Final Report.*

## FIGURE 2: Hierarchical Linear Model Steps



After the seven step models were run for each outcome variable, we tested the interrelationship of variables. Using Oak Ridge data, we examined specific interactions by including a cross product term of the factor with downsizing in the model to determine if certain factors acted as moderators for the effect of downsizing on each outcome.[22] These factors included strain, fairness, race, violence, conflict resolution, supervisor support and co-worker social support.

- **Workgroup level outcomes used in separate model.**

We measured two outcomes of interest--sick time usage and accident rates (known as total recordable cases or TRC)--at the department level (level 3) rather than the employee level.[23] The number of observations available for the analysis of these outcomes (i.e., the number of organizational units) is then relatively small compared to the analyses of the employee level outcomes. Data for all five sites were combined for these analyses to increase our ability to determine the true relationship between model predictors and outcomes. Even though this approach increases the sample size, it does not provide a sufficient number of observations to use the modeling strategy described for the individual level outcomes. These analyses are not included in this site report but instead are included in the *Five Site Final Report.*

## VIB. Hierarchical Linear Models

Hierarchical linear models, also known as multilevel models, can incorporate variation in employee health related to characteristics of the employee, the job and the workgroup. Individuals are affected not only by their personal and job characteristics, but also by characteristics of the social groups to which they belong. In this study, the social unit is the work group. Group characteristics, captured in downsizing, injury, and sick time rates, are distinct from those of individual group members. These group-level variables may affect outcomes independently of individual characteristics or modify how individual characteristics are related to outcomes.

- **Multi-level models assess complex environments.**

The study hypotheses are grounded in a belief that the climate of the workplace as well as of one's immediate workgroup will affect how health outcomes manifest in relation to stressful events. An HLM model allows us to account for similarities between members of the same work group that we may not have measured directly. A recent study testing the Demand-Control Model (Van Yperen and Snijders, 2000) found that differences both between work groups and within work groups (between individuals) were related to health outcomes, with a finding that lower job control contributed to absence rates.

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[22] We used Oak Ridge data to help construct and test models to be applied to the other four sites.

[23] We are not using overtime usage rate as an outcome because it is not recorded consistently for all employees (differences between bargaining unit and exempt employees).

The individual (level 1) is the unit of observation for this first set of models. We account for similarities within divisions (level 3) in this hierarchical model.[24] Level 2 is a workgroup; however, we could not sample at that level because the groups were often too small to offer anonymity and/or to have enough employees to achieve statistical significance. Two of the independent variables (downsizing rate and rate of voluntary layoffs) in this model are measured for level 3 and then assigned to each individual in that group.

As a simple case, consider a two-level model where the employee is level 1 and the workgroup is level 2. At level 1, the outcome for employee i in the jth working group is the sum of an "intercept" (mean) for the employees' working group and random error:

$$Y_{ij} = \beta_{0j} + e_{ij}$$

where $e_{ij} \sim N(0,\sigma^2)$, that is, $e_{ij}$ is distributed as a normal random variable with zero mean and fixed variance. At level 2, the intercept (mean) for the jth working group is the sum of an overall mean and a series of random deviations from that mean:

$$\beta_{0j} = \beta_0 + b_{0j}$$

where $b_{0j} \sim N(0, d_0)$. Using substitution we obtain the multilevel model:

$$Y_{ij} = \beta_0 + b_{0j} + e_{ij}$$

where $\beta_0$ is a fixed effect that represents the average outcome in the population, $b_{0j}$ is a random effect that represents variability between working groups and $e_{ij}$ is a random effect that represents variability within working groups.

## VII. SUMMARY STATISTICS

We present here our findings regarding the rates of downsizing, sick time and accidents at the site. We then present information about the survey responders and descriptive statistics (i.e., means, standard deviation, and range) for important scales included as co-variates or outcomes in our model. For those scales that have been used extensively in other studies, we compare our data to national norms. We also offer a summary of the major concerns employees described in their written comments.

### VIIA. Archival Data

#### A1. Downsizing

The net change in employment from September 1991 (7,402) through September 1998 (6,687) was a loss of 715 employees according to data from the Office of Worker and Community Transition (OWCT) (UC employees only). From the highest employment

[24] Hierarchical models are commonly used in educational studies looking at students within classrooms within schools. Another example is a study of doctors grouped into practice groups within hospitals.

point in 1992 (9,639) to the end of the study, LANL lost more than 1,000 employees or 11% of their population through downsizing as well as attrition. Cumulative layoffs exceeded this number.[25]

We collected downsizing data by level 3 including voluntary and involuntary layoffs from the current contractors, the University of California (UC), Protection Technology Los Alamos (PTLA) and Johnson Controls Northern New Mexico (JCNNM). This data was collected for each study year, 1991 through 1998, for which there were layoffs and available data at this level. At LANL, there were downsizing events in three of the study years but only 44% of these RIFs could be attributed to a current day level 3 given organizational changes, particularly restructuring in 1995. That meant we were only able to calculate level 3 downsizing rates for the two 1995 events. Subcontractor downsizing data was available by level 3 for the study period although PTLA had events only in 1994 and 1995 and JCNNM only reported a single involuntary downsizing in 1995.

- **Downsizing rate varies by study year.**

The University of California laid off or offered early retirement or voluntary reductions to 1,417 individuals in four events between September 1991 and November 1995 (data from contractor). The annual downsizing rate, calculated as the number of people downsized divided by the population at the start of the calendar year, ranged from zero in 1992 (and several other study years) to 9% in 1993 (see Table 1a), with a study average of 2%. Of the employees laid off, 1,087 or 77% received voluntary layoffs. For PTLA, (see Table 2b) the downsizing rate was only above 1% in 1995 (6%) with a study average of .03%. JCNNM involuntarily downsized 22 employees during two events in 1995 (August and November). They are a construction contractor and have large seasonal variations in employment. We were not able to calculate annual rates, as we did not have adequate population data.

**TABLE 1a: Annual Downsizing at LANL (numbers and rates)**
**University of California employees only**

| Year | Population (in January) | Voluntary | | Involuntary IRIF | Total Downsize | Downsize Rate (%) | Voluntary Rate (%) |
|---|---|---|---|---|---|---|---|
| | | VRIF | early retire (ER) | | | | |
| 1991 | 6992 | | | 94 | 94 | 0.013 | 0 |
| 1992 | 9639 | | | | | 0.000 | |
| 1993 | 9549 | | 834 | | 834 | 0.087 | 100 |
| 1994 | 9061 | | | | | 0.000 | |
| 1995 | 8694 | 253 | | 236 | 489 | 0.056 | 0.038 |
| 1996 | 8265 | | | | | 0.000 | |
| 1997 | 8320 | | | | | 0.000 | |
| 1998 | 8575 | | | | | 0.000 | |
| **Study period (1991-1998)** | | 253 | 834 | 330 | 1417 | 0.020 | 12.505 |

[25] Please note that all figures regarding net employment change in this section are from OWCT data while the downsizing data come from the contractors and subcontractors.

**TABLE 1b: Annual Downsizing at LANL (numbers and rates)**
**PTLA employees only**

| Year | Population (in January) | Voluntary VRIF | Voluntary early retire (ER) | Involuntary IRIF | Total Downsize | Downsize Rate (%) | Voluntary Rate (%) |
|---|---|---|---|---|---|---|---|
| 1991 | | | | | | | |
| 1992 | 428 | | | | | | |
| 1993 | 460 | | | | | | |
| 1994 | 437 | 6 | | 7 | 20* | 0.000 | ? |
| 1995 | 439 | 4 | | 22 | 26 | 0.059 | 0.050 |
| 1996 | 381 | | | | | | |
| 1997 | 405 | | | | | | |
| 1998 | 465 | | | | | | |
| **Study period (1991-1998)** | | 10 | | 29 | 46 | 0.030 | |

* For seven RIFs in this total we do not know type or whether they were in 1994 or 1995
4 events (4/94 and 10/95)

If we look at the downsizing rate at LANL by year and by level 3 (Tables 2a and 2b) we see noticeable differences, across years and within a year across level 3s. UC data for 1995, for example, shows that level 3 downsizing rates ranged from 0% to 30%). At PTLA, the level 3 with bargaining unit members had twice the rate of downsizing in 1995 (6.5%) as the other level 3 (3.0%).

We averaged the annual rates for each level 3 to derive a downsizing rate and voluntary rate for the level 3 for the entire study (data from 1991 through 1998). For LANL (combining UC and PTLA employees), downsizing rates are for 1995 through 1998 while at other sites we have rates for the entire study (1991-1998).

**TABLE 2a: Annual Downsizing at LANL, for UC by Level 3 (ranges) (N=29)**

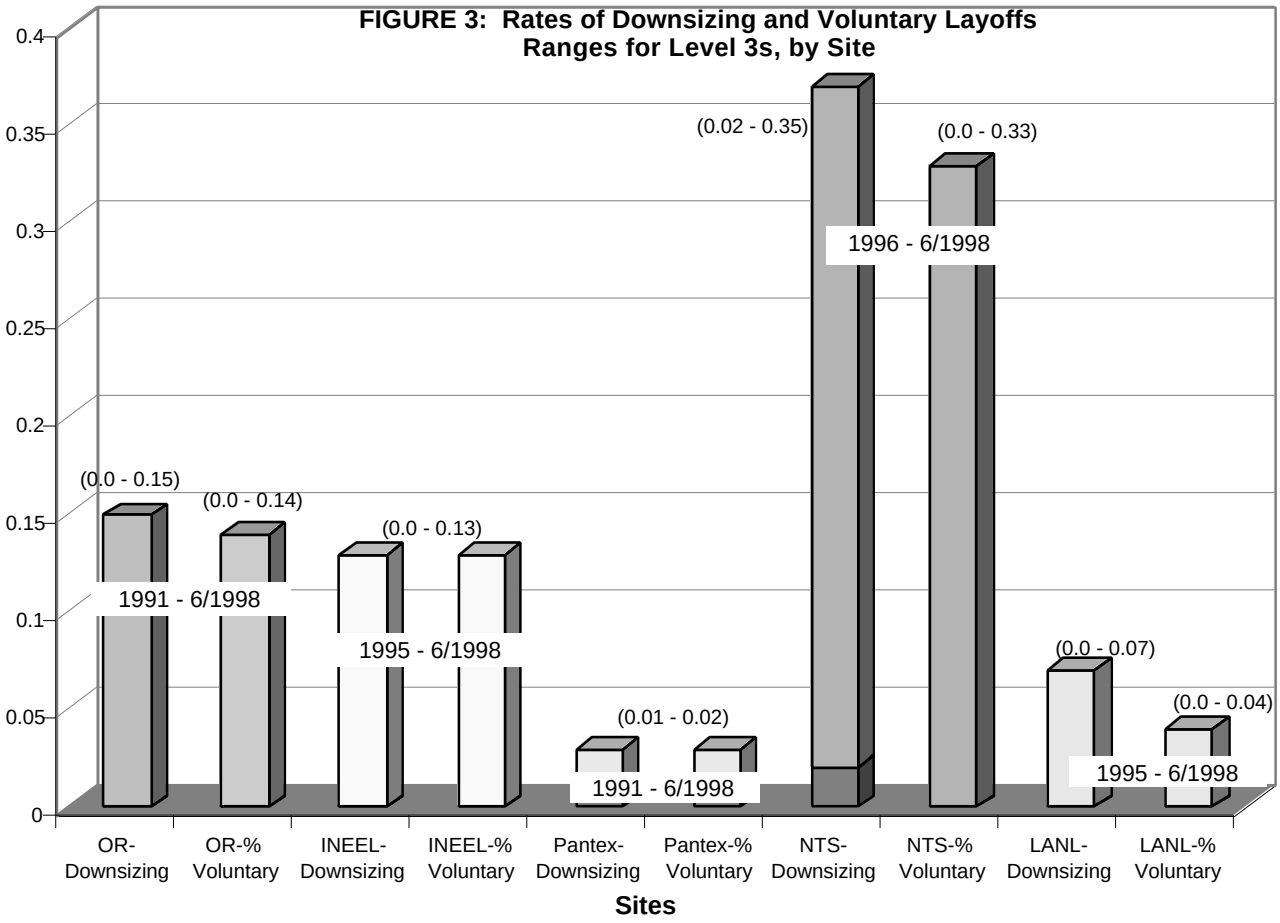
| | Downsizing Rate | | Voluntary Rate | |
|---|---|---|---|---|
| Year | Range (min - max) | Mean | Range (min - max) | Mean |
| 1991* | N/A | N/A | N/A | N/A |
| 1992 | N/A | N/A | N/A | N/A |
| 1993 | N/A | N/A | N/A | N/A |
| 1994 | N/A | N/A | N/A | N/A |
| 1995 | 0.00-0.296 | 0.06 | 0.00-0.148 | 0.04 |
| 1996 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| 1997 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| 1998 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| **Study Period (1995-98)** | | **0.01** | | **0.01** |

* We do not have level 3 data for 1991-1994 for University of California employees

**TABLE 2b: Annual Downsizing atLANL, for PTLA by Level 3 (ranges) (N=2)**

| | Downsizing Rate | | Voluntary Rate | |
|---|---|---|---|---|
| Year | Range (min - max) | Mean | Range (min - max) | Mean |
| 1991 | N/A | N/A | N/A | N/A |
| 1992 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| 1993 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| 1994 | 0.00-0.016 | 0.008 | 0.00-0.00 | 0.00 |
| 1995 | 0.03-0.065 | 0.05 | 0.00-0.011 | 0.006 |
| 1996 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| 1997 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| 1998 | 0.00-0.00 | 0.00 | 0.00-0.00 | 0.00 |
| **Study Period (1991-98)** | | **0.0079** | | **0.0008** |

The bar graph below (Figure 3) shows the range of study period downsizing and voluntary rates across level 3 for each of the five sites. Study period downsizing by level 3 at LANL (two contractors combined) ranges from 0% to 7.4%, with a mean of 1.4% and 90% of the level 3s with a downsizing rate of 1% or less. The voluntary rate is similar, with a range from 0% to 3.7% with a mean under 1%. The rates at LANL are comparable to those at Pantex, and lower than at the three other study sites. There were almost three years between the time of the last downsizing event and the survey administration. At LANL, we observed the most open contention and litigation regarding the downsizing.




## A2. Sick time and accident data

We summarized two of the organizational outcomes of interest by level 3. Rates of sick time usage and total recordable cases (TRC or accidents) were calculated for the period July 1997 through June 1998 (the last 12 months of the study prior to survey administration). Table 3 shows the descriptive statistics for this data across level 3. These rates are for sick time and accidents for main contractor employees.[26] The study-wide analysis of this data, using these two workgroup measures as outcome variables, will be presented in the *Five-Site Final Report.*

[26] The PTLA sick time data were significant outliers (possibly because of incorrect data given) and rates for JCNNM data could not be calculated as the contractor did not supply complete employee census information.

**TABLE 3: Sick Time Rates and Total Recordable Cases for LANL and All Sites**
**University of California employees only**

| Facility | Mean | Standard Deviation | N (# of level 3s) | Range (min - max) |
|---|---|---|---|---|
| LANL | | | | |
| Sick time rate | 59.89 | 17.61 | 30 | 25.17 - 91.26 |
| TRC rate | 0.03 | 0.03 | 30 | 0 - 0.15 |
| All Sites Combined | | | | |
| Sick time rate* | 64.79 | 26.48 | 78 | 18.35 - 149.78 |
| TRC rate | 0.03 | 0.03 | 126 | 0 - 0.15 |

where: sick time rates= sum level 3 sicktime hours from July 1997-June 1888 per level 3 population
trc rates= sum level 3 trc 7/97 -6/98 per level 3 population
* Data from three sites where sick time is recorded separately.

## VIIB. Survey Data: Descriptive Tables

### B1. Survey responders

- **High response rate is obtained.**

We sampled 10,645 employees from our five study sites (or 43% of all eligible employees at those sites) to receive the *Boston University Workplace Survey*. Overall, 55% of those sampled (5,897) completed and returned their surveys between July and November 1998 while at LANL only 45% of the sample or 1,570 employees (1,396 UC, 96 JCNNM and 78 PTLA) [27] completed the survey. This represents a lower return rate than the other sites although if we eliminate the subcontract employees (JCNNM) not included in the analysis, the response rate increases to 49.2%. Response rates at the five sites are shown in Table 4.

**TABLE 4: Survey Response Rate by Site**

| Site | Percent of employees who returned survey |
|---|---|
| INEEL | 71% |
| Nevada | 68% (includes 2 contractors) |
| Pantex | 62% |
| Oak Ridge | 48% |
| LANL | 44% (includes prime + 2 subcontractors, UC alone: 50%) |

The majority of the LANL sample are male (67.8%), Caucasian (71.5%), and younger than fifty years old (61.8%). Responders are extremely well educated: over 68% have completed college or attained a degree beyond college. The largest segment of responders is exempt, salaried employees (72.4%) and only 2.2% are members of a

[27] While there were 1,570 responders from LANL overall, and 1,474 if we consider just PTLA and UC employees, some of the totals in the tables below are lower as they refer to the number of employees responding to particular demographic or other questions. Percentages are calculated using the responders for the particular item as the denominator.

bargaining unit. Demographic information on LANL responders, including University of California (UC) and Protection Technology Los Alamos (PTLA) employees,[28] is summarized in Table 5.

[28] From here onward, all data presented is for University of California (UC) and Protection Technology (PTLA) employees only. We were not able to include data for employees of Johnson Controls (JCNNM) as we did not have adequate organizational data for the model (particularly level 3 census counts to calculate downsizing rates).

**TABLE 5: Survey Responder Demographics (for UC and PTLA employees)**

| | | N* | % of responders |
|---|---|---|---|
| ***Gender*** | Female | 468 | 32.2 |
| | Male | 984 | 67.8 |
| ***Race/Ethnicity*** | White/Caucasian | 1014 | 71.5 |
| | Native American/Alaskan | 18 | 1.3 |
| | Asian/Pacific Islander | 18 | 1.3 |
| | Black/African American | 2 | 0.1 |
| | Hispanic | 332 | 23.4 |
| | Multiracial | 34 | 2.4 |
| ***Education Level*** | Grades 7-11 | 1 | 0.1 |
| | Grade 12/GED | 48 | 3.3 |
| | High School Plus Other Training | 126 | 8.6 |
| | Associates Degree/2 Year College | 105 | 7.2 |
| | Some College | 181 | 12.4 |
| | Bachelors Degree | 314 | 21.5 |
| | Advanced/Professional Degree | 684 | 46.9 |
| ***Age*** | 20-29 | 42 | 2.9 |
| | 30-39 | 339 | 23.3 |
| | 40-49 | 517 | 35.6 |
| | 50-59 | 489 | 33.7 |
| | 60+ | 66 | 4.5 |
| ***Marital Status*** | Married/Significant Other | 1153 | 79.3 |
| | Single, Never Married | 120 | 8.3 |
| | Separated | 13 | 0.9 |
| | Divorced | 159 | 10.9 |
| | Widowed | 9 | 0.6 |
| ***Spouse Job Status*** | Works Outside Home | 879 | 60.5 |
| | Does Not Work Outside Home | 573 | 39.5 |
| ***Children*** | Yes | 1105 | 76.0 |
| | No | 349 | 24.0 |
| ***Household Income*** | < $15,000 | 2 | 0.1 |
| | $15,000 - $30,000 | 25 | 1.8 |
| | $30,001 - $60,000 | 328 | 23.0 |
| | $60,001 - $90,000 | 492 | 34.5 |
| | $90,001 + | 578 | 40.6 |
| ***Pay Status*** | Exempt (not eligible for overtime) | 1005 | 68.6 |
| | Exempt (eligible for overtime) | 55 | 3.8 |
| | Nonexempt | 374 | 25.5 |
| | Bargaining Unit | 32 | 2.2 |
| ***Tenure*** | | mean=14.6 years | |
| | 1 - 2 years | | 5.0 |
| | 3 - 8 years | | 20.0 |
| | 9 - 14 years | | 25.0 |
| | 15 - 20 years | | 25.0 |
| | 21 - 29 years | | 20.0 |
| | 30 or more years | | 5.0 |

* There were 1,570 responders from LANL and 1,474 for just UC and PTLA employees.
The numbers in Table 5 are those answering the specific survey item and the percents are calculated using the number of people responding to the specific item, not total responders.

- **Site has tradition of long tenure.**

As with most DOE sites, employees of the Los Alamos National Laboratory have long job and site tenure. Of those responding to the survey, the average site tenure is 15 years (similar to the all site sample with a mean of 14.5 years) with 90% of employees at the site for at least five years.

- **Responders were representative of the site but differ in some key respects.**

In Table 6, we compare responders with all site employees on demographic variables including gender, race, age, and union status. The group of responders was fairly comparable to the site overall, although responders had slightly higher than representative responses from older employees and female employees, less non-white representation and half the expected responses from union members. Los Alamos is the study site with the largest proportion of non-Caucasian employees (35.4%) and the smallest percentage of bargaining unit employees, although the subcontractor workforce is highly unionized. We were not able to conduct a statistical comparison of responders and non-responders to determine if there was a non-response bias because of the method used to maintain responder confidentiality.[29]

**TABLE 6: Survey Responder Demographics Compared to LANL Population**

UC and PTLA employees*

| | Responders | | All employees | |
|---|---|---|---|---|
| Variable | # | % of responders | # | % of total |
| N** (sample = 2999) | 1474 | 49.2% responded | 6954 | 43% sampled |
| Female | 468 | 32.2 | 2072 | 29.8 |
| Non-white | 404 | 28.5 | 2428*** | 35.4 |
| ***African Amer*** | ***2*** | ***0.1*** | ***24*** | ***0.3*** |
| ***Latino*** | ***332*** | ***23.4*** | ***2121*** | ***30.9*** |
| ***Asian/Native American/Alaskan Native*** | ***36*** | ***2.5*** | ***283*** | ***4.1*** |
| 50 years or above | 555 | 38.2 | 2632 | 37.9 |
| Union member | 32 | 2.2 | 302 | 4.3 |

NOTES

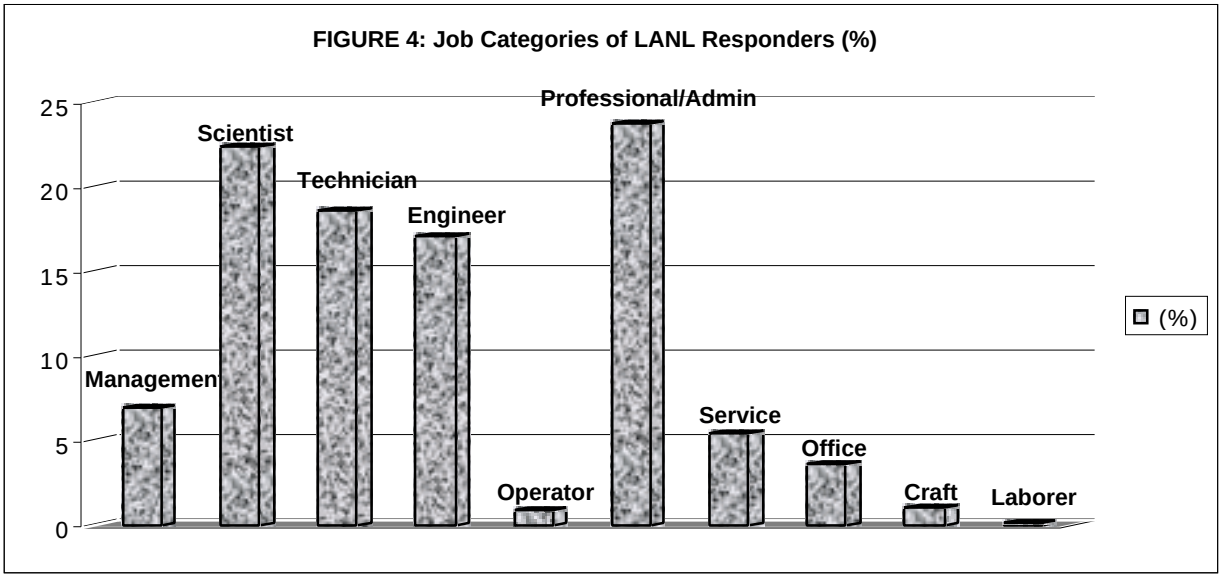
* JCNNM responder demographics not listed as the population was excluded from further analysis.

** Percent is determined by the number of people responding to the specific item, not total responders.

*** Race/Ethnicity was not reported for 92 UC employees in the UC all employee file. Estimates based on known race/ethnicity.

[29] We could not create two groups to compare statistically (responders and non-responders) as we only knew who had sent back a postcard but not who had returned a survey. The best comparison then was to the site demographics overall.

The Los Alamos National Laboratory is primarily a research and development facility. This mission is reflected in the distribution of employees across job categories. The 10 job categories below (Figure 4) are taken from the Department of Energy's Common Classification System (COCS).




## B2. Summary statistics on survey scales

Table 7 lists the summary statistics (i.e., mean, standard deviation and range) for the nine outcome scales in the survey instrument and the other scales and indices included in this model. The scale scores have been standardized (zero to 100 points) for easier comparison.[30]

[30] Information of interest referenced earlier includes the tables describing the conceptual basis and the statistical basis for each scale. They can be found in Appendices L and M.

**TABLE 7: Descriptive Statistics for all Survey Variables**

| | LANL | | | | All Sites Sample | |
|---|---|---|---|---|---|---|
| **Variable (Standardized)** | **N** | **Mean** | **SD*** | Score Range (Min-Max) | **N** | **Mean (SD*)** |
| ***Outcomes scales and indices:*** | | | | | | |
| SF-12 Physical Component Summary (PCS) | 1394 | 75.86 | 9.50 | 26 - 96 | 5608 | 74.55 (10.25) |
| Medical Conditions | 1457 | 10.92 | 12.23 | 0 - 63 | 5808 | 11.72 (12.89) |
| Medical Symptoms | 1460 | 23.42 | 21.80 | 0 - 100 | 5831 | 24.57 (22.83) |
| SF-12 Mental Component Summary (MCS) | 1394 | 66.06 | 14.06 | 15 - 88 | 5608 | 65.91 (14.36) |
| Survivor Syndrome | 1285 | 59.54 | 11.28 | 20 - 97 | 5340 | 59.98 (11.77) |
| Perceived Stress | 1458 | 45.05 | 14.17 | 20 - 100 | 5836 | 45.42 (14.29) |
| Job Security | 1361 | 44.09 | 10.87 | 25 - 79 | 5523 | 52.84 (13.82) |
| Work Performance | 1475 | 15.69 | 13.48 | 0 - 78 | 5897 | 13.04 (12.37) |
| Morale | 1463 | 59.62 | 17.25 | 20 - 100 | 5856 | 55.69 (17.96) |
| ***independent or co-variate scales and indices:*** | | | | | | |
| Individual downsizing experiences | 1402 | 22.47 | 21.10 | 0 - 100 | 5670 | 25.21 (21.86) |
| Fairness/Downsizing process | 1327 | 55.16 | 12.79 | 21 - 93 | 5505 | 54.43 (11.73) |
| Strain | 1395 | 22.99 | 5.22 | 12.0 - 56 | 5550 | 23.88 (5.85) |
| Matrixing | 1439 | 10.40 | 22.33 | 0 - 100 | 5744 | 11.75 (23.39) |
| Alcoholism | 1417 | 4.38 | 13.46 | 0 - 100 | 5697 | 4.37 (14.18) |
| Violence | 1458 | 13.95 | 23.83 | 0 - 100 | 5805 | 14.76 (24.91) |
| DOE | 1446 | 49.72 | 15.97 | 20 - 100 | 5817 | 52.25 (16.29) |
| Communication | 1457 | 56.25 | 18.21 | 20 - 100 | 5840 | 54.22 (18.98) |
| Conflict Resolution | 1422 | 57.71 | 12.49 | 20 - 97 | 5761 | 57.79 (12.84) |
| Supervisor Support | 1445 | 75.53 | 14.95 | 25 - 100 | 5785 | 74.41 (15.32) |
| Coworker Support | 1442 | 76.36 | 11.29 | 29 - 100 | 5772 | 75.88 (11.43) |
| Safety and Health | 1460 | 78.08 | 12.11 | 25 - 100 | 5830 | 77.29 (12.62) |
| Toxic Exposure | 1460 | 44.66 | 12.87 | 33 - 100 | 5798 | 47.30 (15.31) |
| Noise | 1464 | 46.72 | 12.95 | 25 - 100 | 5824 | 47.30 (13.62) |

*standard deviation

## B3. Summary statistics compared to national norms

Three of the outcome scales are nationally used and validated measures. We were able to compare data from LANL employees and our entire sample (All Sites) to those national norms; that information is presented in this section with a table in Appendix N. We also incorporated other widely used measures into our survey, in particular, several scales from the Job Content Questionnaire (JCQ).[31] We do not present comparative norms here because the international JCQ norms are reported by job category and differ from those that we collected in this study (comparisons are pending).

[31] Scales from the JCQ include psychological job demand, skill discretion, decision authority, supervisor social support, co-worker social support, toxic exposure, noise exposure, macro decision authority and job insecurity.

We compared summary statistics from our sample with general population norms for the two SF-12 scales and for perceived stress.[32] Because our demographic categories differed from the way the normative data was grouped, we were limited in our ability to test comparisons. Reported here are results from a one-sample t-test to determine whether scores on PCS, MCS and perceived stress were different among LANL and the sample of all five sites combined (All Sites) compared to published, general population norms.[33] We compared our data (both LANL-specific and All Sites) with national norms for both the total samples and by gender.

- **Comparisons to national norms reveal expected as well as unanticipated results.**

In summary, LANL data showed significant differences from the national population on the physical health scale (PCS). The LANL sample scored 3 points higher than the national population and both males and females scored roughly 2.5 points higher. This trend was also seen for all sites data as well. Both the LANL population and the All Sites sample, when compared overall and by gender to the national data, demonstrated poorer mental health on both the MCS and perceived stress scales.

All but the differences of mean scores for females on the perceived stress scale were statistically significant. Though these findings were statistically significant, it is not clear how the score differences (0.1 to 1.2 lower on perceived stress, 2.5 to 3.1 higher on PCS, and 1.8 to 2.9 points lower on MCS) translate into health differences.

In general, we might expect that a working population would be healthier than a general sample of US adults. For physical health as measured by the PCS scale, this expectation holds. One might also expect workers to have better mental health scores than the general population. However, our hypothesis that downsizing has an overall stress effect on employees is borne out by these results which show LANL and the total study populations with slightly lower mental health on the MCS and higher perceived stress than the normative data.

## B4. Review of the *Boston University Workplace Survey* comments

Our survey included two open-ended questions encouraging respondents' comments on the following: 1) important job issues not addressed in the survey and 2) ideas for improving the quality of one's work life. All comments were entered into a database. A list of categories and subcategories was created and used to code comments (see Appendix O for coding themes). Frequencies were run on the categories for both open-

[32] Comparative national data for the SF-12 is described in the SF-12 Manual: "How to Score the SF-12 Physical and Mental Summary Scales, " Third Edition, Quality Metric Inc. Comparative national data for the perceived stress scale is described in: Cohen, S., and Williamson, G. (1998). Perceived Stress in a probability sample of the United States. In S. Spacapam, and S. Oskamp (Eds.), The Social Psychology of Health: Claremont Symposium on Applied Social Psychology. Newbury Park, CA: Sage.

[33] Higher scores on PCS and MCS mean healthier physical and mental status while a higher score on perceived stress indicates higher stress levels or a less healthy status.

ended questions to identify areas about which respondents most frequently commented (889 employees or 57% of respondents offered one or more comments).

- **Employees report a variety of concerns.**

The majority of the comments from LANL employees (UC, PTLA and JCNNM employees) fell into four general categories: organizational (structural) issues, assessment of management and employee-management relations, job demands and human resources concerns. Within these categories, employees documented a wide variety of concerns and, at times, expressed conflicting opinions. A summary of the major points is presented here.

Comments concerning organizational issues focused on the procedural nature of work, lack of funding for projects and the need to train employees. A majority of the responders who commented on these issues mentioned unnecessary and excessive bureaucracy, paperwork and procedures at the LANL and the resulting effects of these policies. Employees reported that procedures often lack clarity; making interpretation difficult and hampering productivity. They also emphasized the need for continual training to meet the challenges of one's job and for purposes of career development. Respondents also stated that there was a lack of accessible tools and equipment at the site, which has contributed to a decrease in productivity. They wrote that the skills attained from training and the availability of equipment would improve the quality of their products and output at the site.

Comments on management and employee relationships focused on both the size of management and management style. Employees repeatedly suggested reducing both the size and levels of management. Fifteen percent of comments in this category stated that LANL lacked management with skills and knowledge necessary to be good leaders and managers. Examples of such comments include: "We have far too many managers with aggressive (or worse, passive/ aggressive) communication styles," and "Hire managers who have a clue about management. Technical expertise is not a guarantee of leadership or managerial ability." The comments reflected employee concern regarding a perceived lack of caring and communication that exists between employees and managers. Poor communication has led to a situation where employees feel that they are not given decision-making opportunity at the site. Some comments suggested that having more contact with upper management through meetings or social activities would improve the present level of communication.

Employee concerns about job demand focused on workload and work schedule. Many felt that workloads had increased after the 1995 downsizing events and that work quality had subsequently decreased. As a result of the 1995 RIF, some responders stated that their organization had fewer employees available to do the amount of work required. One person stated " With the RIF, employees left behind pick up the extra work, longer hours, but no extra pay." Some employees expect management to hire support staff employees to assist them in their extra responsibilities. However, some people felt that workload could be addressed by redistributing employees and reducing redundant roles at the site. Most employees who wrote about work schedule favored a schedule of four ten-hour days while others preferred having a flextime policy and

telecommuting options to both reduce long commutes and provide a better balance between work and family.

A majority of those concerned about human resources issues (6% of the comments fell in this category) discussed the need for a better system of performance rating. One employee wrote: "Promote by merit, not by who you are and who you know." A sense of discrimination exists among some employees concerning the manner in which discipline is enforced and rewards are allocated. Some comments outlined that a number of professional and racial groups feel that management treats them unfairly compared to other groups at the site.

## VIII. MULTI-LEVEL MODEL RESULTS

We used multilevel modeling (HLM) to incorporate group-level variables into a contextual analysis. This allows us to capture information not provided by individual-level data. HLM also helps us understand the outcomes for individuals while accounting for similarities within work units. By constructing the model in steps, we see how each set of independent variable(s)--downsizing rate, downsizing process--is associated with the physical health, mental health, and organizational outcomes and how each operate when job strain and other individual and work focused co-variates are added. As mentioned in Section VI, outcomes are grouped into physical health outcomes, mental health outcomes and outcomes related to organizational functioning and each group contains three scales or indices.

In this section we briefly discuss individual characteristics (demographics and job characteristics) included in the model as potential confounders. We present the results for each of the independent and other key variables. We then provide findings about conceptually interesting co-variates, specifically those related to organizational climate and job characteristics. This overview focuses on the full model (step 7 of the hierarchical linear model) and comments on how key variables function differently in earlier steps of the model. At the end of this section we discuss results related to the fourth hypothesis regarding the way in which seven variables modify the impact of downsizing on health and functioning. We summarize the overall findings and interesting issues in the discussion (Section IX) and conclude with recommendations based on these findings.

Scores for all continuous scales were standardized and have a possible range of zero to100. We report mean and standard deviation for variables and, in the tables, present the effect size (beta coefficient) and note the p value when a variable is significantly associated with an outcome. Complete results for each of the nine outcomes are attached as Appendix P and a summary of how core variables perform throughout the seven steps of the model, for each of the nine outcomes, is presented in Appendix Q.[34]

[34] For additional information, see Table 7 above for descriptive statistics for all scales and Appendix M to understand how to interpret scale scores.

## VIIIA. Individual Level Controls

- **Associating demographic variables with outcomes provides important data.**

Five of the demographic variables measured in the survey[35] were characteristics possibly associated with some of the nine outcomes and were therefore controlled for in the model: age, race/ethnicity, gender, marital status, and having a child(ren) under six years of age at home. As expected, increasing age was significantly associated with worse health (lower PCS score). Gender was associated with all three physical health outcomes, with females reporting better health. Both being married and having a child under six years of age were associated with fewer survivor syndrome symptoms while having a child was associated with greater job insecurity.

Job characteristics including pay status (bargaining unit/non-bargaining unit), tenure at site, matrixing, and job category,[36] emerged from interviews and focus groups across sites as being differentially impacted by workplace changes. These job characteristics were seen as important co-variates and therefore entered in the final model.

It is interesting to note that pay status remained significant when all variables were included in the final model for three outcomes such that bargaining unit respondents reported fewer medical symptoms, had better mental health status (PCS) and reported higher employee morale.

The scale on matrixing focuses on the individual experience of the employee, assessing the experience with this job format (e.g., adequacy of supervision, connection to group, etc.) but it is also clearly tied to work structure. A higher score indicates a more negative experience with matrixing. The matrix scale was statistically associated with six of the study outcomes, more than at any other study site. A more negative experience as a matrixed employee (e.g., low connection to group, inadequate supervision, etc.) was predictive of more reported medical conditions and symptoms, lower mental health scores, greater likelihood of survivor syndrome, higher stress and less job security.

We also controlled for tobacco and alcohol use. Surprisingly, tobacco use was not significant for any of the health outcomes[37] nor was the number of drinks consumed per week. A higher score on the alcoholism index was significantly related only to more frequent occurrences of poor work performance.

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[35] Other individual level variables measured but not included in this model were: income, second job and health insurance. These variables were cut as we attempted to create a leaner model.

[36] Some of the job characteristics in the survey were excluded from this model because of lack of variability in responses. The variables excluded were: shift, number of overtime hours worked, management level and the number of days per week worked outside of one's main work group.

[37] The variable may not have been sensitive as finally measured. While we included information about start and quit years in the survey, in this analysis people are divided into those who have never used any form of tobacco and those who have ever or currently use any form of tobacco.

## VIIIB. Downsizing

Our first study hypothesis assumes that downsizing and health outcomes are associated. Individuals in work groups with higher downsizing will have more adverse health outcomes than individuals in groups with lower downsizing. In addition, higher downsizing rates will be associated with poor organizational functioning as measured by scales on work performance, job security, and morale, and by sick leave and accident rates.

Again, the downsizing variable is calculated for each organizational unit or level 3 at the site as the average of the annual rate for each study year from 1991 through 1998.[38] At LANL, downsizing data was averaged over 1995-98 and two events in 1995 were included, one voluntary and one involuntary. The downsizing rate is applied to each individual in the level 3.

At LANL, the downsizing rate variable ranged from 0% to 7.4% across the 31 level 3s in the model (UC and PTLA divisions) with a mean of less than 2% and 90% of the observations with a downsizing rate below 2.3%. LANL experienced less downsizing, as measured by rate, than three of the other sites in the study. Downsizing events took place at the beginning of the 1990s and then in the 1994-95 period. However, LANL is also the site where employees reacted most negatively to the layoffs and the process used to carry them out. Many of the employees separated in 1995 brought a class action lawsuit against the University of California charging them with discrimination on the basis of race/ethnicity and age. The lawsuit took several years to resolve and the claim of age discrimination was sustained.

- **Downsizing is statistically significantly related to only one outcome variable.**

As Table 8 demonstrates, downsizing rate was significantly related (borderline) to only one of the nine outcomes at LANL, job security. Employees had a paradoxical response, with higher levels of downsizing associated with more job security (beta=-214.27, p=0.054).[39] When downsizing rate was looked at alone against job security (step 1) the association was in the expected direction but was not significant; the direction changed and became significant when other variables were added in step 5.

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[38] At each site, we averaged annual rates for the number of years that data were available: LANL and INEEL since 1995 both experiencing three downsizing events; Oak Ridge since 1991 with six downsizing events between 1991 and 1995 and several events each year from 1996 through 1998; Pantex, since 1991 with one downsizing event; and NTS since 1996 with three downsizing events. Details regarding rate calculation are in Appendix H. At INEEL and NTS a change of prime contractor meant that the previous records of downsizing were at a site-wide level (not by level 3). At LANL, the University of California restructured extensively in 1995 and, again, previous records were not traceable to a level 3 measure.

[39] Higher scores on the outcomes scales can mean better or worse outcomes as follows. A higher score on these outcomes means better health and functioning: PCS, MCS, morale. A higher score on these outcomes means worse health and functioning: medical conditions, medical symptoms, survivor syndrome, perceived stress, job security (higher=greater insecurity), work performance (higher=more instances of poor work performance). Review Appendix L for more information on interpretation of scales.

**TABLE 8: Hierarchical Linear Modeling Results for Downsizing Rate and Process Measures**

| Outcome (N) | Downsizing Rate *B* estimate | Fairness *B* estimate | Voluntary Rate *B* estimate | Downsizing Experiences *B* estimate |
|---|---|---|---|---|
| Physical Health | | | | |
| SF-12 Physical Component (PCS) (885) | 40.01 | 0.00 | -144.55 | 0.00 |
| Medical Conditions (889) | -79.06 | **-0.13*** ** | 88.14 | **0.08*** ** |
| Medical Symptoms (893) | -72.01 | **-0.13*** | 152.01 | **0.13*** ** |
| Mental Health | | | | |
| SF-12 Mental Component (MCS) (885) | -13.92 | -0.02 | -73.45 | **-0.09*** ** |
| Survivor Syndrome (864) | 2.47 | **-0.14*** ** | 73.30 | **0.04*** |
| Perceived Stress (907) | -70.21 | 0.00 | 96.48 | **0.06**** |
| Organizational Health | | | | |
| Job Security (887) | **-214.27*** | **-0.12*** ** | **440.72**** | **0.03*** |
| Work Performance (905) | -5.38 | 0.07 | 131.92 | 0.02 |
| Morale (892) | -42.48 | 0.05 | -79.07 | -0.03 |

***where: *p≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001***

We examined the possibility of a non-linear effect of downsizing using the Oak Ridge data as a test case. We included a quadratic term in each model, testing for its impact on each outcome. This term was only significant for PCS indicating that as downsizing increases, PCS also increases but this effect diminishes for the highest levels of downsizing. This result--the same association found for downsizing rate--suggested that it was not critical to test this alternate version of downsizing at the other four sites.

Surprisingly, downsizing was only significantly associated in five other cases at the five sites, with three of the significant outcomes at Pantex. At Pantex, the downsizing rate was also associated with job security but in the opposite direction (more insecurity). Downsizing was surprisingly associated with better health status at two sites (NTS and Y-12) and associated with the MCS and medical conditions in the expected direction at Pantex (higher downsizing associated with lower mental health scores and more conditions.

## VIIIC. Downsizing Process

Study Hypothesis 2 states that in a context where downsizing was a given, how the downsizing was carried out would influence the health and organizational outcomes. Specifically, greater worker involvement, more extensive communication about plans, timing and implementation, a higher rate of voluntary layoffs, and a downsizing process that employees perceived as fair would all result in a more cohesive workforce with fewer negative health, safety, and organizational functioning outcomes. We thought that some of these factors might vary within site (between work groups) as well as between sites. Hypothesis 2 also posits that the extent to which an individual personally experienced downsizing would influence physical and mental health and organizational functioning outcomes.

Downsizing process was discussed extensively in interviews and focus groups. We included three measures of downsizing process in the final hierarchical model: fairness or justice of the downsizing, individual experiences of the downsizing, and the rate of voluntary layoffs in a given organizational unit (voluntary departure or early retirement programs). We did not include another measure of process--the goals of the downsizing events and whether they were achieved--because too many responses were missing.[40]

## C1. Fairness

The fairness scale (E6 in the survey, Appendix F) asks employees to respond to 14 questions regarding the most recent downsizing event at their site. The scale includes items about interactional justice and formal procedures,[41] communication, timing, and worker involvement. Higher scores on the fairness scale correspond to perceptions of a more fair and open downsizing process. At LANL, scores on the fairness scale ranged from 21.4 to 92.9 with a site mean of 55.2 and standard deviation of 12.8.

- **Perceived fairness is statistically significantly related to health.**

Fairness was significantly related to four of the nine outcomes (see Table 8, above). The higher the perceived fairness, the healthier the person as measured by indices of medical symptoms ($p \leq 0.03$) and chronic medical conditions ($p \leq 0.0005$). Greater fairness was associated with fewer survivor syndrome symptoms ($p \leq 0.0001$). With respect to organizational outcomes, the more fair the downsizing, the more job security expressed ($p \leq 0.0001$) and the higher the reported morale ($p \leq 0.01$).

For the five outcomes where fairness was not significant in the final model (PCS, MCS, perceived stress, work performance and morale), it was significantly related to the outcome through step 6 in the model. This suggests that organizational climate and job characteristic variables added in step 7 are confounding the association with fairness and these four outcomes (Rothman and Greenland, 1998).

Fairness was associated with less job insecurity at all five sites, and with lower survivor syndrome scores at four of the five study sites. It appears that, across site, people report fewer health problems (symptoms and/or conditions) the more fair they perceive the downsizing process.

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[40] Either people did not understand the question (E1) or they did not feel qualified to comment on the goals of the downsizing.

[41] The justice questions were adapted from a procedural justice scale developed by Niehoff and Moorman, 1993. Some of the language was changed in this section to refer directly to a downsizing event rather than to general perceptions of procedural justice at a workplace. A general justice scale is included in the survey (C7) but was not included in the final model as it was highly correlated (.44) to this scale.

## C2. Voluntary layoffs

- **Rate of voluntary layoff is surprisingly statistically associated with job insecurity.**

We hypothesized that voluntary and involuntary downsizing processes reflect distinct levels of worker involvement and worker control over the outcome and therefore would have different impacts on employee health. The rate of voluntary layoffs ranged from 0% to 7.4% with a mean of 1.4% and 90% of observations with a rate below 2.3%. In this model, the rate of voluntary layoffs was significantly related only to job security with the surprising relation that the higher the rate of voluntary layoffs in a work unit, the more insecurity is experienced ($p \leq 0.007$ with effect size of 440.7). The variable was only significant for one additional outcome at the two other sites where it was included in the models,[42] again in an unexpected way (greater voluntary rate associated with lower MCS at the Nevada Test Site).

## C3. Individual experiences of downsizing

We created an index to count the ways in which someone had experienced the event(s), with a range from no effects to seven possible impacts, such as being laid off and later rehired, participating in RIF planning, handing out layoff notices or having a friend laid off. Scores on the downsizing experiences index at LANL ranged from zero to 100 with a mean of 22.5 (lower than the total sample mean of 25.2) and standard deviation of 21.1.

- **Findings suggest that downsizing negatively affects physical and mental health.**

The downsizing experiences index was significantly related to six outcomes, including all three mental health outcomes. We found that more personal experiences with the downsizing was correlated with a worse mental health status (MCS) at all five sites. At four sites (all except Pantex) the more aspects of downsizing an individual experienced directly, the more insecure about job future he or she felt and the more medical symptoms were reported. At LANL, a higher score on this index was also predictive of more reported medical conditions and more perceived stress. Interestingly, the index was not significantly correlated with morale at any site. Also surprising was that the individual experiences of downsizing index was only associated with survivor syndrome at LANL, with employees reporting more symptoms. This suggests that research into survivors needs to delve deeper and look at differences within the group of remaining employees

[42] We were only able to include this variable in the site models for LANL, Oak Ridge, and Nevada Test Site. All layoffs at Pantex and INEEL were voluntary and thus the rate was the same as the downsizing rate. We did not include this variable at those two sites to avoid co-linearity problems.

## VIIID. Strain

We assume that job strain is associated independently with the outcomes. We also believe that there may be a moderating effect between job strain and downsizing, a hypothesis we discuss below in the section on interactions (see Section VIIIF).

Strain consists of a job demands dimension (defined by how fast and hard one works and whether one has sufficient time to get the job done) and a control dimension (defined by the ability to use skills on the job as well as the decision-making authority available to the worker). The job strain model emphasizes the relationship between demands and control in causing stress: the greatest risk to physical and mental health from stress occurs to workers facing high psychological workload demands or pressures combined with low control or decision latitude in meeting those demands. In this study, we use the "quotient" model of job strain to create a continuous independent variable--demands divided by latitude.[43]

- **Qualitative data indicates that downsizing worsens job strain.**

It is clear that downsizing may worsen job strain--either or both as an increase in job demand and a decrease in job control—although we could not test this relationship in this cross-sectional model. A recent study found that physical demands increased and autonomy and skill discretion (control) decreased in major as compared to minor downsizing (Kivimaki, et. al., 2000). Study respondents, in written and oral comments, spoke extensively about work demands as well as the inability to structure their work. One employee at LANL wrote: "with the RIF, employees left behind pick up the extra work, longer hours but no extra pay." Another mentioned that being "understaffed makes my job less enjoyable. It also makes the work less efficient and cuts down on quality." This was supported by many while others in focus groups felt that the real problem was the distribution of work among employees or the lack of task variety. This is consistent with the findings of Vahtera and colleagues (Vahtera and Pentti, 1999) who reported that worse health outcomes after downsizing were seen for those in job categories that had been significantly reduced (perhaps leading to work overload).

[43] The quotient term is nonlinear and tends to give more weight to latitude (the denominator) than demands. There are other formulations of job strain including one that dichotomizes strain at an arbitrary cut-point.

**TABLE 9: Hierarchical Linear Modeling Results for Job Strain Variable**

| | Outcome (N) | Job Strain *B* estimate |
|---|---|---|
| Physical Health | | |
| | SF-12 Physical Component (PCS) (885) | 0.08 |
| | Medical Conditions (889) | -0.06 |
| | Medical Symptoms (893) | **0.58*** ** |
| Mental Health | | |
| | SF-12 Mental Component (MCS) (885) | **-0.63*** ** |
| | Survivor Syndrome (864) | **0.20** ** |
| | Perceived Stress (907) | **0.60*** ** |
| Organizational Health | | |
| | Job Security (887) | **0.31*** ** |
| | Work Performance (905) | -0.05 |
| | Morale (892) | **-0.47*** ** |

***where: *p≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001***

- **Greater job strain is predictive of six negative outcomes.**

At Los Alamos, scores on the job strain scale ranged from 12 to 56 with a mean of 23 and a standard deviation of 5.2. A higher score is indicative of more strain. The five site mean on job strain was 23.9 (standard deviation=5.9).

Greater strain at LANL is predictive of increased reporting of medical symptoms (see Table 9, beta=0.58, p≤0.0001). This association is also seen at three other sites. Strain is associated with each of the two other physical health measures only at INEEL. Higher strain scores were associated with all three of the mental health outcomes: lower general mental health functioning (beta=-0.63, p≤0.0001), higher survivor syndrome scores (beta=0.2, p≤0.006) and greater perceived stress (beta=0.6, p≤0.0001). These findings were seen at all sites (except Oak Ridge for survivor syndrome).

Strain at LANL is also associated with two of three organizational / workplace outcomes. Higher strain scores are related to greater job insecurity (beta=0.31, p≤0.0001). Apparently, having less control over work affects how secure one feels in one's current job as well as one's perceptions regarding new job opportunities. In the same way, individuals reporting greater strain are more likely to report poorer morale (i.e., assessing the morale of yourself and your co-workers) (beta=-0.47, p≤0.0001).

Consistent with the study Hypothesis 3, job strain was a strong and consistent predictor of negative health and performance outcomes. Strain was significantly associated with 30 out of 45 outcomes across all sites. It is clear that high job strain is an important predictor of negative outcomes in sites that are experiencing downsizing events over time.

## VIIIE. Organizational Climate

We hypothesize (Hypothesis 3) that one's immediate environment, as measured by management and operating style and group functioning, can affect health and

functioning in the workplace and may also influence how stressful events are experienced. HLM allows us to account for similarities within groups on these climate measures. In this section we discuss three groups of climate and operating variables. In Section VIIIF, we review how four of these factors interact with downsizing in the model.

## E1. Organizational style

Four organizational style variables are included in the HLM model: violence, conflict resolution, DOE relations, and communication.[44] The violence and harassment variable is a three-item index (yes or no) that measures whether in the past 12 months the employee has been threatened, attacked, treated unfairly, or made uncomfortable by words or actions while on the job. A higher score indicates more experiences of threats or harassment. For the other three scales, a higher score indicates a more positive outcome, that is, better communication, more effective resolution of conflicts, and better working relations with the local DOE office.

**TABLE 10: Hierarchical Linear Modeling Results for Organizational Style Measures**

| Outcome (N) | Conflict Resolution *B* estimate | DOE Relations *B* estimate | Violence *B* estimate | Communication *B* estimate |
|---|---|---|---|---|
| Physical Health | | | | |
| SF-12 Physical Component (PCS) (885) | 0.02 | 0.01 | 0 | 0.02 |
| Medical Conditions (889) | **0.08*** | -0.05 | 0.03 | -0.03 |
| Medical Symptoms (893) | 0.08 | **-0.10*** | 0.03 | -0.08 |
| Mental Health | | | | |
| SF-12 Mental Component (MCS) (885) | 0.06 | **0.10**** | -0.03 | 0.03 |
| Survivor Syndrome (864) | -0.07 | **-0.06*** | 0.01 | 0.00 |
| Perceived Stress (907) | -0.04 | 0 | 0.04 | -0.02 |
| Organizational Health | | | | |
| Job Security (887) | -0.03 | -0.02 | -0.02 | **-0.07**** |
| Work Performance (905) | **-0.09*** | 0 | **0.05**** | -0.04 |
| Morale (892) | **0.13**** | **0.10**** | -0.03 | **0.13***** |

***where: *p≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001***

[44] Other measures of organizational climate were considered conceptually important and were included in the survey but not in this model for one of three reasons: 1) they were highly correlated with another scale already in the model; 2) they had a low alpha coefficient; or 3) conceptually they can serve as a co-variate, an outcome or both. Variables that were dropped for these reasons are: role ambiguity, organizational commitment, skill loss, supervisor style, feedback quality, opportunity, procedural justice (general scale, not downsizing specific) and innovation. The survey question regarding site mission was not included because more than 8% of the sample did not complete it.

- **Unlike the other study sites, violence is only associated with one outcome while two of the other organizational measures emerge as more important at LANL.**

Of the four organizational style variables, the violence and harassment index is statistically significantly related to the outcomes twice as often as the other three variables at the five sites overall but is only predictive of poor work performance at LANL (see Table 10).[45] When examined as a group, one or more of these four organizational climate variables is significantly related to seven of the nine outcomes at LANL and 40 of the 45 outcomes across site. No organizational climate variable is significantly related to either the overall physical health score or to perceived stress at LANL.

The DOE relations scale was associated with four of the outcomes we were interested in. The better the reported relations with DOE at Los Alamos, the fewer medical symptoms ($p \leq 0.05$), the higher the mental health status ($p \leq 0.002$), the lower the survivor syndrome ($p \leq 0.02$) and the higher the morale for the group ($p \leq 0.002$). Overall, good relations with DOE were most often significantly related to the mental health outcomes (lower survivor syndrome scores at three sites and lower MCS at two sites), to lower medical symptoms (two sites) and to better morale (two sites). This scale did not emerge as important at either INEEL or Nevada Test Site (significant for none and one outcome respectively) although employees at both those sites did discuss these issues in the focus groups and interviews.

The communication scale was only associated with better job security ($p \leq 0.006$) and higher morale at LANL ($p \leq 0.0001$). At the other four sites better communication was also significantly related to higher morale ($p \leq 0.001$). Better communication was associated with less job insecurity at two other sites (NTS and INEEL) and with fewer medical conditions at one site (Pantex). In focus groups, participants felt that a lack of communication about the RIF contributed to high stress.

We included six items to measure conflict resolution within work groups and between contractors (C8, page 9 of survey). The mean score at LANL was 57.7 with standard deviation of 12.5. Better conflict resolution was significantly associated with three outcomes at LANL: better work performance and higher morale, as well as more medical conditions. Subcontractor employees and some UC employees discussed non-UC employees being treated as "second class citizens" at the site and the feeling of competition amongst companies but did not note specific organizational conflicts. Employees of subcontractors are more likely to be craft employees, bargaining unit members and to be of Hispanic descent than employees of the University of California.

Better conflict resolution was associated with higher employee morale at four sites. Across sites, it was significantly related to study outcomes 13 times, most often the three organizational outcomes and most frequently at INEEL (a predictor for seven of the nine outcomes).

[45] Violence is significantly related to 22 outcomes across the five sites (of a possible 45) with each of the other variables related to 13 or fewer: conflict resolution (13), DOE relations (11), and communication (9).

## E2. Social support

Social support is a measure of work climate and has been examined as a modifier of job strain (Johnson and Hall, 1988). In our model, we hypothesize that strong support from one's supervisor or co-workers will be associated with better health outcomes and might serve to mitigate potential negative stress and health outcomes caused by downsizing. The mean scores (and standard deviations) for supervisor support and co-worker support are 75.5 (15.0) and 76.4 (11.3) respectively with higher scores indicating more support.

**TABLE 11: Hierarchical Linear Model Results for Supervisor and Co-Worker Support Measures**

| | Supervisor Support | Co-worker Support |
|---|---|---|
| **Outcome (N)** | ***B*** estimate | ***B*** estimate |
| Physical Health | | |
| SF-12 Physical Component (PCS) (885) | -0.02 | 0.04 |
| Medical Conditions (889) | -0.04 | -0.04 |
| Medical Symptoms (893) | -0.08 | **-0.18**** |
| Mental Health | | |
| SF-12 Mental Component (MCS) (885) | 0.04 | 0.08 |
| Survivor Syndrome (864) | -0.02 | 0 |
| Perceived Stress (907) | -0.06 | -0.03 |
| Organizational Health | | |
| Job Security (887) | -0.05 | -0.06 |
| Work Performance (905) | 0 | -0.03 |
| Morale (892) | **0.26***** | **0.33***** |

***where: *p≤ 0.05, **p ≤ 0.001, ***p ≤ 0.001***

- **Neither measure of social support was an important predictor for LANL employees.**

At LANL, as at the four other study sites, greater support from one's co-workers and supervisor were significantly related to higher morale ($p \leq 0.0001$ for both). As shown in Table 11, greater co-worker support was also correlated with fewer medical symptoms ($p \leq 0.009$), but otherwise the variables were not significantly associated with outcomes. Support was a particularly important predictor variable at the Oak Ridge site (each type of support associated with five outcomes) while supervisor support was important at NTS and co-worker support was important at Pantex (each associated with four outcomes). Overall, it appears that support is most important when analyzing mental health outcomes and organizational functioning outcomes.

## E3. Safety and health

We measured three health and safety factors in the workplace: general perceptions of the health and safety climate, perceived exposure to noise, and perceptions of exposure to toxic materials or environments. We hypothesized (Hypothesis 3) that feeling unsafe

at work might be associated with negative health outcomes and poorer workplace functioning, as well as making one more vulnerable to stress effects. The health and safety scale is an eight-item scale; the mean score at LANL was 78.1 with a standard deviation of 12.1 with higher scores representing a more health and safety conscious work environment. The single item question on noise asks how loud one would have to talk to be heard by someone standing next to him or her from whisper (low score) to shout (high score). The mean score was 46.7 (standard deviation=13) and the mean score on the three-item toxic exposure scale was 44.7 (standard deviation=12.9) with a higher score indicating that one is exposed and that it is a "sizable or great problem."

- **Two of the safety measures are statistically associated with more outcomes at LANL than at the other study sites.**

The more that workers perceive that the work environment is healthy and safe, the higher the overall health scores reported ($p \leq 0.005$), the less frequent the poor work performance ($p \leq 0.0001$), and the higher the morale ($p \leq 0.03$) as seen in Table 12, below. The association between a safer workplace and higher employee morale was found at NTS and INEEL as well. Otherwise, this variable was only related to four additional outcomes at the other four sites. Noise exposure was not significantly related to any outcome at LANL and only to two outcomes study-wide.

**TABLE 12: Hierarchical Linear Model Results for Safety Measures**

| | | Safety | Toxics | Noise |
|---|---|---|---|---|
| | **Outcome (N)** | ***B*** estimate | ***B*** estimate | ***B*** estimate |
| Physical Health | | | | |
| | SF-12 Physical Component (PCS) (885) | **0.08**** | **-0.11***** | 0 |
| | Medical Conditions (889) | 0.04 | **0.09**** | 0 |
| | Medical Symptoms (893) | 0.04 | 0.07 | -0.05 |
| Mental Health | | | | |
| | SF-12 Mental Component (MCS) (885) | 0.01 | **0.07*** | 0.02 |
| | Survivor Syndrome (864) | -0.05 | 0.02 | -0.03 |
| | Perceived Stress (907) | -0.02 | -0.03 | -0.02 |
| Organizational Health | | | | |
| | Job Security (887) | 0.02 | **0.08**** | 0 |
| | Work Performance (905) | **-0.15***** | 0 | -0.04 |
| | Morale (892) | **0.09*** | 0 | -0.04 |

***where: *p≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001***

Greater perception of toxic exposure was predictive of three negative outcomes (poorer physical health, more medical conditions, and more job insecurity) but also of a better overall mental health (MCS score) (Table 12, above). The relationship between toxic exposure and job insecurity was seen at two other sites (Oak Ridge and INEEL) but otherwise the variable was associated with only two other outcomes at the other study sites (more medical symptoms at NTS and more medical conditions at Pantex).

At the five sites overall, one of the three safety variables was significantly associated with one third of the outcomes, most frequently at LANL (six of the 15 associations). When one of the variables was significant, it was most often an association with a

physical health or organizational functioning outcome, particularly medical symptoms, job security and morale.

### VIIIF. Interaction Effects

Hypothesis 4 states that the effect of downsizing may depend on the presence of moderating variables. For example, employees with high strain and in work groups with high downsizing might be more likely to have poorer health outcomes than individuals with low strain in the same group. Or, as another example, employees in two groups exposed to the same level of downsizing may demonstrate different outcomes depending on the style and practices of their supervisors, the perceived fairness of the downsizing, or the level of social support they receive from co-workers and supervisors.

- **Interactions of downsizing with seven variables are not predictive of outcomes.**

We examined specific interactions of downsizing with strain, fairness, race, violence, conflict resolution, supervisor support and co-worker social support, using the Oak Ridge data. Of the 63 interaction terms tested (nine outcomes by seven potential moderators) only the interaction of downsizing with conflict was significant at the .05 level ($p=0.0267$). Considering the number of interactions tested and the magnitude of this effect, this result is likely due to chance alone. We therefore decided not to insert interaction terms into the models for LANL or the other three sites.

## IX. DISCUSSION

Our study--one of the few to examine survivor health and reactions in a post-downsizing work environment--has provided a tremendous opportunity to explore a newly emerging research area. Downsizing is an epi-phenomenon representing change in organizational structures, economic relationships, employee-employer expectations, generational characteristics and bargaining styles. However, this opportunity is also associated with significant, potential pitfalls. The theoretical and conceptual nature of downsizing, stress, and health has not yet been charted. Thus, researchers coming to this topic map out their models with a sense of trepidation as well as excitement.

Our research is the largest of its kind—in both scale and scope—to investigate the health and organizational effects of workplace restructuring. We have approached this study with great care. Ensuring that we have applied the most rigorous methods, we brought together the knowledge of various disciplines including public health, occupational health, organizational management and organizational psychology. In this section we discuss our findings in light of the four main study hypotheses:

1. Downsizing will have a negative effect on individual health and workplace functioning (i.e., employee morale, work performance and job security).
2. Employees are less likely to experience negative health effects and organizations are more apt to function normally the fairer the downsizing

process and the fewer direct elements of downsizing the employee experiences.

3. During periods of organizational change, one's work and work environment, including job strain, organizational style, co-worker and supervisor support, and workplace safety will affect both individual health and workplace functioning.
4. Workplace factors including job strain, organizational climate, and the employee's perception of the fairness of the downsizing process can moderate the impact of downsizing on health and organizational outcomes.

## IXA. Does Downsizing Negatively Affect Health?

The finding that the level of downsizing is only associated with one outcome at LANL and with five others at the remaining study sites is at odds with our expectations and with the observations of other researchers of this topic. Similarly, the lack of findings of any significant interaction effects between downsizing and seven key variables on our outcomes was surprising. Even in the absence of a statistical association, qualitative data emphasized the strong impact of both downsizing and the fear of downsizing on employees. Many factors may account for these findings.

- **Methodological and data constraints must be considered to interpret statistical significance.**

Researchers explored methodological explanations for why downsizing rate did not emerge as a predictor of negative health outcomes while downsizing process and other work and organizational factors were clearly associated with the outcomes in our study. Limitations to the data that may have obscured the ability to observe a potential effect fell into three categories.

Researchers collected downsizing data and calculated downsizing rates. Possible limitations exist in the exposure term that we created and in our ability to compare level 3s.

- Downsizing exposure was not highly variable within each site (across level 3s).
- The range of downsizing rate was smaller than for other key variables and may have been too small to demonstrate an effect (e.g., downsizing rate 0-15, fairness 21-93, downsizing experiences 0-100, and job strain 11-76).
- Downsizing data from early study years were attributed to current day level 3s and, given the extent of organizational changes, may have been incorrectly assigned, resulting in non-differential misclassification of exposure data. In essence, this reduced the ability to demonstrate a relationship between exposure and outcome.

Downsizing happened at these sites at the same time that other organizational changes were being implemented. It is possible that we did not capture the best measure of change and how it affects individuals and the workplace.

- The variable chosen may not be the best to measure downsizing.
- Decisions about the rate of layoffs and the type of layoffs for any given

Section 3161 event are made on a site-wide basis and therefore, differences between level 3s may be statistically significant but not conceptually meaningful.
- We did not measure directly organizational changes other than downsizing (e.g., restructuring, outsourcing, work stoppages, downsizing by means of attrition)[46] in the model.

Elements of the study design and the relationship between exposure and outcome influenced the potential to see significant effects.
- The cross-sectional design used is less able to detect differences in outcome measures than a longitudinal study examining impacts over time.[47]
- Unlike the study of many acute and chronic occupational diseases, in studying downsizing we do not know the shape of the relationship between exposure and effect, the latency period if any between exposure and effect, and the most important outcomes to characterize.[48]
- Our model assumes a linear relationship between downsizing exposure and outcome: the greater the downsizing, the greater the outcome. It may be that this is an incorrect assumption and that the true exposure-outcome relationship is captured by a non-linear relationship.[49]

In summary, it was not clear at the start of the study how intertwined downsizing and organizational restructuring were. This real world problem posed significant methodological issues that we have attempted to address. However, we recognize that, though broad, our choice of measures and models may not be the most comprehensive way to disentangle the complex relationship between downsizing and change. Since downsizing is a change existing within a complex network of events, more work is needed to determine how best to measure it as an independent variable. Downsizing represents one kind of organizational change (in this case used as a means to increase efficiency and respond to reduced budgets) and it may be important to measure the concomitant organizational changes such as departmental restructuring and contract changes.

It remains to be determined whether downsizing rate was generally not significant because there is indeed no effect on health or because the metric we used to capture downsizing may have been ill suited in this case. Other studies that have found an

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[46] A recent study by Amabile and Conti (1999) measured downsizing using three self-report measures. They found that anticipated downsizing and workgroup stability were more likely to be associated with the outcomes of interest (creativity) than the reported rate of completed downsizing.

[47] The recent Kivimaki (2000) study examined downsizing and health data at three intervals during a five-year period. Their design enabled them to observe a relationship between downsizing rate and sickness absence as well as between downsizing and job strain over time.

[48] In conducting preliminary analyses we did explore other measures of downsizing rate. Yet even when we limited our analysis to the impact of downsizing events within the 12 months before the survey, no clearer picture emerged at Oak Ridge, the only site with annual events over the entire study period, or at other sites without recent events.

[49] When we tested a quadratic term for downsizing in the Oak Ridge model, we did not identify additional significant relationships. This may again reflect problems with how the downsizing data was defined or collected.

association between rates of downsizing and health similarly report that changes in work characteristics including increased work load / demand, decreased job control and decreased support account for a large portion of the effect size (Vahtera and Pentti, 1999).

## IXB. Does a Fair Downsizing Process Result in Fewer Negative Impacts?

- **Downsizing process variables emerge as significant predictors.**

While neither the downsizing rate nor the rate of voluntary layoffs emerged as significant predictors for the outcomes of interest, several of the downsizing process variables did. Both individual downsizing experiences and fairness were significantly related to four or more of the outcomes at LANL and half the outcomes when looking at results from the five sites together. It is possible that the nature of the downsizing for DOE contractor personnel--with national communication and guidelines (Section 3161) about the process--made process issues of paramount interest to the workforce. In essence, the employee experiences downsizing through the process, including fairness, justice, communication, interpersonal treatment and personal experiences of downsizing. The process is both perceived and felt more directly, giving it more meaning. Workers may believe that they have the ability to make positive changes to the downsizing process and to organizational climate whereas input into setting workforce numbers is not perceived as feasible. The outcomes used in our study are probably best suited to pick up these relationships as they are predominantly *self-reported, individual* measures.

- **The rate of voluntary layoffs is not associated with healthier outcomes.**

The rate of voluntary layoffs, which we have assumed measures levels of worker involvement in the process and a worker's control over outcome, was significantly related to only two outcomes study-wide (included in the model for three sites). In both instances the association was with a more negative outcome (with more job insecurity here at LANL and with a lower MCS score at NTS). One problem with this measure as it was ultimately derived is that it reports on the rate of voluntary downsizing but does not compare voluntary to involuntary downsizing within a level 3. For example, a level 3 may have a higher voluntary rate than another group and also have more involuntary layoffs than the comparison group (accounted for only by total downsizing rate).

- **A more fair downsizing process is associated with greater job security and lower survivor syndrome as well as better health.**

Employees who perceived that they were respected and had an opportunity to participate in the downsizing process felt more secure about their job future (seen at all five sites), and exhibited less frustration, anger, sadness and depression. In contrast, those who perceived a less just or fair process experienced a greater sense of sadness, guilt, and "aloneness" or survivor syndrome (seen at four of the sites). According to Noer (Noer 1993), this latter group is more likely to experience negative effects on work

performance such as less risk-taking and lowered productivity. Their sense of lessened job security and reduced organizational commitment may deleteriously affect other aspects of their work lives.

Other studies have found that employees experiencing survivor syndrome have diminished trust with their co-workers, less job satisfaction, and increased conflict with colleagues. As one employee at LANL noted on her survey, "The RIF [that] took place here a few years ago was totally arbitrary. I don't think the upper managers who made the decisions even read previous performance evaluations of those involved. Lower managers (like myself) had virtually no say in the decisions. That's why I quit managing." And, it is clear from our qualitative data and, at LANL, the continued talk of the lawsuit challenging the 1995 involuntary RIF, as well as the downsizing experiences index that workforce restructuring touches everyone, not just those who are laid off. Across sites, people report fewer health problems (symptoms and/or conditions) the more fair they perceive the downsizing process. This may support other authors' hypotheses that in a setting with greater justice, stressful events (e.g., downsizing, restructuring) are less disruptive, potentially leading to fewer negative health outcomes.

An organization may experience these employee effects in the form of reduced workforce cohesion and lowered productivity. Our qualitative results indicate a perceived relationship between increased reporting of health complaints, utilization of health care services and heightened insecurity and low morale, although the available EAP data do not permit us to test this association.

In our study, the justice questions relate to the fairness of rules, procedures and implementation: that is, a focus on interactional and procedural justice. We did not study distributive justice because separation benefits were similar across the DOE complex and generally perceived as generous or fair. For example, focus group participants did not discuss the adequacy of layoff packages offered to separated employees. While this focus is supported by others who emphasize the role of management in helping employees adapt to change (Dowd and Bolus, 1998), it may underestimate the importance of rewards (mentioned extensively in survey comments) and monetary support during times of change. A study by Brockner and others found that adequate compensation to those laid off reduced the survivor syndrome symptoms amongst remaining employees (Brockner, et. al., 1987).

In LANL focus groups, employees did discuss the general reward system, with many feeling that financial rewards are "not performance based: the letters after your name are what count." There was also a significant theme of differential treatment for employees of UC versus employees of subcontractors. This emerged regarding compensation and packages for downsized employees as employees with similar tenure received different benefits. Survivors did comment on the survey that rewards are not adequately given to high performing employees: "the system protects the poor performer and punishes the manager who tries to correct the problem." Survivors are also concerned in that employment at LANL offers the best chance at well compensated employment in the Los Alamos area.

The findings for justice / fairness are important for an organization considering downsizing. Employees' perceived lack of justice and fairness in the process can lead to negative mental and physical health effects as well as reduced efficiency and decreased group performance and morale. Conversely, we find the opposite in efficient, more open and fair organizational units. Developing mechanisms for employee participation, creating and adhering to organizational procedures, and open, timely, and honest communication can be major focal points for positive intervention. It is interesting that fairness emerged as significantly associated with outcomes, even though the DOE had well-defined policies to mitigate adverse impacts from downsizing, particularly by offering benefits to separated employees.

- **Workers who experienced more elements of downsizing reported negative physical and mental health effects.**

The measure of an individual's direct encounters with downsizing was significantly associated with lower mental health scores (MCS) and with greater job insecurity at all five sites and with more medical symptoms at four sites. At LANL, more downsizing experiences was predictive of six negative outcomes: the three just mentioned as well as more medical conditions, more symptoms of survivor syndrome and greater perceived stress. The index can be seen as an individual measure of downsizing. These employees represent a significant at-risk group: the six elements measured included implementing the RIF, changing jobs or departments, having close friends laid off, and being laid off and rehired.

In this era of chronic downsizing and restructuring, we need to pay closer attention to those on the front lines implementing, observing and experiencing the new policies. Site managers can examine each downsizing element to determine those most predictive of negative health and functioning outcomes and whose impact can be mitigated through interventions.

## IXC. Do Work Environment and Job Strain Affect Health During Times of Change?

In this study of downsizing organizations, several measures of job control and organizational climate emerge as variables related to the health and organizational functioning outcomes. The organizational climate, which might best be thought of as the unspoken rules of conduct, appears to directly affect individual health and measures of workplace functioning. The employees' perceptions of management support, communication, and commitment to a vision and goals, are important aspects of the work environment. Where the environment is perceived as positive, employees report better individual and organizational health. Climate, as manifested by management policies and procedures, supervisor support and by a commitment to a safe workplace, is an area in which a relatively small investment can reap a large harvest of employee benefits.

**• Job strain was designed as a key measure in this study of organizational change.**

We chose the Job Strain Model as the theoretical core of our analysis as it appeared to be directly applicable to the study of the effects of chronic strain in the DOE workforce. Job strain did emerge as a key theme in the focus groups and interviews, and survey results confirm that increased job strain is associated with poor health outcomes. We do not know what component of the strain the downsizing causes, although it is clear that as the Department of Energy's mission, budget, and contracting mechanisms change, there are fewer personnel and monetary resources. The possibility for greater demand, both on individuals and organizations, along with fewer resources to meet the demand, and less say in performing one's job may all lead to strain. The Job Strain Model captures the dimensions of organizational and work changes brought about by downsizing. Its content domains facilitate a study of the effects of chronic strain in the DOE workforce.

**• Qualitative findings point to job strain as a source of stress in the workplace.**

Our findings in focus groups and interviews suggest that changes in the DOE mission along with reducing the workforce affect stress levels within the organization. In particular, it may be that increased job demand or a corresponding decrease in control has led to greater job strain within some organizational units. It appears that many workers felt lucky to still have a job, but in return faced uncertainty about the future. As one employee stated in the survey, "I do enjoy my work but it is either heaven or hell. Either I am so overloaded that I can not possibly get everything done that needs to be done, or I face the potential that I will get Riffed because there is no money to pay my salary… About the only thing that keeps me going is the fact that I am 55, I have planned well, I can retire when I need to and I intend to do so if I survive that long."

Our assessment of the qualitative data shows that continued prospects of layoffs also undermined workers' sense of control. Many LANL respondents discussed the lack of a decision-making role for employees: "The people doing the work should have more input on the decisions that affect both our jobs and our work," wrote one respondent. The challenging managerial style mentioned in focus groups may also undermine a sense of job control. Unfortunately, we could not directly test the relationships between job security, management style and decision-making and job control statistically in this cross-sectional study.

**• Study expands the traditional use of the Job Strain Model.**

Our findings highlight the relationship between strain and mental and physical health outcomes as well as between strain and morale and job security, expanding upon the documented relationship to cardiovascular disease and musculo-skeletal disorders. Schnall and Landsbergis, in a 1994 article, summarized the existing literature on this topic indicating increased risk of cardiovascular disease or all-cause mortality for individuals in high-strain occupations compared with subjects in other occupations. Others have shown that reduced control and significant workload pressure can inhibit creativity in the workplace (Amabile and Conti, 1999). Our study, however, examines how well strain predicts a variety of outcomes including physical health, mental health, and organizational outcomes.

Job strain proved to be an important predictor for outcomes in this study: employees with higher strain did less well on five of the nine measured outcomes than those with lower strain scores. Modifying job strain, either by reducing demand or increasing control, could improve employee outcomes. Prior to an intervention, further analysis could tease out which dimension of job strain should be altered, demand or control or both. However, we do need to consider some methodological concerns that have been raised in the literature. Hurrell and others (Hurrell, et. al., 1998 and Kasl, 1987) have discussed the problem with self-reported measures of job stress. Many researchers discuss the need to further identify and collect objective measures of job stress.

Although we were unable to utilize objective measures of job strain, we did collect objective measures of downsizing, and two objective outcome measures, used in the level 3 analysis. All of the outcome measures in our individual level model presented in this report as well as most of the co-variates come from self-report data. Hurrell also raises questions about the lack of predictive validity that self-report measures of strain have shown for morbidity (Hurrell, et. al., 1998). These concerns may be somewhat offset by the fact that many of these scales have been extensively used in similar research efforts and have standardized norms from large samples.

- **Employees value effective communication from management but it does not predict better health outcomes.**

Based on the qualitative findings and previous studies that document a link between downsizing and poor communication (Noer, 1993), it appeared that communication would emerge as an important variable in the survey. However, better communication was only associated with higher morale and more job security at LANL and with only nine outcomes across all five study sites. Employees discussed communication extensively in the focus groups: whether their own supervisors communicated effectively, whether there was good communication between upper management and middle management, when information about reductions were shared, and the impact of good and poor communication.

Confusion about the rationale for the RIF remained although Laboratory management felt that it had been explained clearly. At times, poor communication is attributed to lack of managerial expertise: “Scientists are promoted to management positions. He has no training in management, is not necessarily a good communicator. [They are] taking a very productive scientist and moving them (sic).” It is surprising that a topic discussed so extensively in interviews and focus groups would not be statistically significantly associated with more of our study outcomes. The concept of communication, though, is covered in several items in the downsizing fairness/justice scale that was significantly associated with many outcomes.

- **Employees are concerned about new safety procedures.**

Either the overall health and safety scale or the toxic exposure measure was significantly related to six of the outcomes at LANL. Respondents in focus groups reported that there has been increased attention to safety. Many felt that it has gotten to a point of “overkill” where regulations and paperwork are too much of a burden or

create a “tension between working efficiently, safely and financially efficiently.” Some felt that there had been a loss of skills as people with the greatest expertise left and others were not trained to take over. Respondents believe that safety breaches are likely to increase as a result of increased workload, greater stress, and more workers in positions for which they are not properly trained.

- **Factors that appear related to depression and low morale can guide change.**

Another interesting finding at LANL was that focus group participants reported depression as well as low morale amongst themselves and their co-workers. Site and hired EAP staff should explore this in greater detail. Statistical predictors of lower morale in this model were higher job strain, lack of co-worker and supervisor support, poor communication, being a non-union employee, lack of effective conflict resolution patterns and mechanisms, a worse health and safety climate and a poor relationship with the local DOE office. A better relationship with DOE was related to three other outcomes as well, in a protective fashion. Employees at LANL reported the lowest mean score on this scale (49.7) of all five sites.

- **Findings for bargaining unit members may point to the importance of workers’ involvement in downsizing and change processes.**

It would be interesting to look further at the differences between bargaining unit and non-union employees. LANL has a high rate of bargaining unit members among subcontractor employees (particularly the security force and construction workers) whereas the main contractor does not have many employees represented by unions (approximately 2%). Being a union member was significantly associated with fewer medical symptoms, better overall mental health (i.e., higher MCS score) and higher employee morale. Union employees in our analysis were protective force (security) employees working for Protection Technology Los Alamos (PTLA). It is possible that the nature of protective force work explains the findings regarding physical health among bargaining unit employees. However, it is possible that membership in a bargaining unit may add some sense of knowledge about how downsizing decisions will be made (as stipulated in the contract) and is indicative of greater worker voice or control leaving one less susceptible to stress-related health impacts. This suggests that having more information and perhaps a voice in the process may make one less susceptible to stress-related health impacts. Organizations can reinforce worker voice and control by inviting employee groups into the process and giving them decision-making power.

- **Both work structure and race/ethnicity emerged as important factors at LANL but not at other study sites.**

Among matrixed employees, those who reported more problems with this work structure also documented worse outcomes on six measures, including all three mental health outcomes. Survey comments also addressed the problems with a matrixed structure. One LANL employee made a simple request: "Get 'dematrixed' and belong where I work." Problems with matrixing as expressed by employees include: “lack of familiarity with the facility in which you work, multiple bosses, decreased likelihood of

being well evaluated or receiving recognition or raises, and the down times between work assignments." These findings may be related to a component of job control although the statistical associations were seen while holding job control constant.

The variable measuring differences in experience based on one's race/ethnicity was statistically significant only at LANL where it was associated with five outcomes. This was the site where we heard the most comments regarding discrimination and, particularly, the sense that downsizing decisions had been linked to issues of ethnicity. One respondent explained: "While groups of people were not targets-- support job categories were. Thus, people hired locally were RIFed preferentially, which meant Hispanics." Given these qualitative findings, it is interesting to note that being non-white and/or Hispanic was a protective factor for mental health, medical conditions and better work performance. It is also interesting that the scale measuring violence and harassment was not predictive of more poor health outcomes at LANL given extensive discussion of discriminatory behavior and treatment at work in survey comments and focus groups. The perception of ethnic discrimination was positively correlated with selection bias and lack of information in a study examining the relationships between perceived information access, selection fairness and ethnic discrimination during downsizing (Larkey, 1993). These findings should be explored further.

### IXD. Does Downsizing Interact with Other Variables to Impact Employee Health and Well-Being?

We did not find statistically significant relationships to the study outcomes when we paired downsizing rate with other variables such as conflict resolution, supervisor support, job strain, fairness and race/ethnicity, using Oak Ridge data. In light of these findings, we did not test these interaction terms in models for Los Alamos National Laboratory or the other three sites. We believe that we were limited in our ability to detect the importance of these interactions by the same data limitations described with respect to the downsizing measure in Section IXA. Given that our measure of downsizing was rarely associated with the outcomes of interest on its own, we were not able to effectively test the hypothesized moderating effect of these other variables on the impact of downsizing on individual health and functioning at work (Hypothesis 4).

## X. SITE-SPECIFIC FINDINGS, RECOMMENDATIONS AND NEXT STEPS

The workplace and its employees exist in a complex and interdependent social structure. Worker health, as a function of physical and social-psychological factors found in the work environment, can be affected when that environment is disturbed. Downsizing and restructuring represent departures from the homeostasis typical of workplaces as little as ten years ago. While downsizing rate as measured here had few statistically significant effects at LANL or the other study sites, the manner in which the workplace and its management and workers respond to change has significant impacts

on health as found in this study. In addition, work structures can be seen to influence health (e.g., a matrix structure or patterns of communication and conflict resolution), particularly when these structures appear inadequate to the specific work environment or do not adapt successfully during times of change.

In our study of employees of the Los Alamos National Laboratory and four other DOE sites, each at its own stage of downsizing, we found that job strain, organizational climate and methods of implementing change are, in fact, associated with employee health and organizational functioning. While this cross-sectional study could not elucidate the natural history of downsizing and its impact over time on employees, we did identify opportunities for change within downsizing organizations that can improve employee health and organizational well-being. In the DOE complex, these are areas that may be more amenable to positive change than the actual downsizing rate.

Several of the major findings at LANL and the study overall are fruitful to examine in light of potential interventions. The variables that were related to employee health may suggest possibilities for workplace interventions to mitigate the negative impacts on employee health and workplace functioning.

## XA. Findings at the Los Alamos National Laboratory

- **Employees who perceived that downsizing was implemented with clearly explained reasons, worker input, open, respectful, truthful and unbiased communication with employees, and consistent and fair rules experienced fewer negative health effects.**
    - A process perceived as just and fair was associated with fewer reported medical symptoms and conditions.
    - Greater fairness was associated with fewer survivor syndrome symptoms.
    - The more fair the downsizing, the more secure employees were in their jobs.

- **Employees who reported more direct experiences of the downsizing performed worse on six of the nine outcome measures.**
    - A higher score on the downsizing experiences index was associated with more medical symptoms and conditions.
    - These employees had lower mental health scores (MCS) and reported more survivor syndrome symptoms and higher perceived stress.
    - The more downsizing elements experienced, the greater the job insecurity.

- **Employees who experienced greater job strain reported an increase in adverse individual and organizational functioning outcomes.**
    - Workers with higher job strain reported a greater number of medical symptoms.
    - Higher job strain was associated with poorer mental health status, more survivor syndrome symptoms and higher perceived stress.

- Morale and job security were lower for employees who reported high strain.

- **Job characteristics, workplace safety and organizational relations were frequently associated with our study outcomes.**
  - Matrixed employees who experienced difficulty with this job structure also reported significantly more health problems (symptoms and conditions), worse mental health (all three outcomes) and more job insecurity.
  - The perception of a safe and healthy workplace with no consistent danger of toxic exposure is predictive of better overall physical health, fewer medical conditions, a more secure job future, better work performance and higher employee morale but also with a lower overall mental health score.
  - Employees who felt their management had a more effective and smoother relationship with the Department of Energy reported fewer medical symptoms and better overall mental health (MCS) were less likely to report survivor syndrome and felt that employee morale was higher.

- **People of color (non-whites/Latinos) working at LANL appeared healthier on several of our outcome measures although there were also many reports of discriminatory treatment.**
  - People of color reported fewer medical conditions and better mental health (on all three measures) as well as fewer instances of poor work performance.
  - Many employees raised issues of discrimination, particularly against Latinos and subcontractor employees (who are more likely to be non-white than UC employees) in matters of promotions, job performance reviews, the selection for downsizing, and the daily work environment.

## XB. Recommendations for Intervention

Together, these findings suggest possibilities for workplace interventions to mitigate the negative impacts on employee health and workplace functioning. In order to be most effective, an intervention design should address multiple levels of the organization and a variety of approaches.

- **Interventions can vary and should focus on a variety of targets for change.**

We identified prime areas for intervention and possible activities based on the findings at Los Alamos National Laboratory and the five sites overall. Our recommendations incorporate information from new research on prevention and reduction of workplace stress. Ganster has identified the importance of identifying and targeting multiple levels of organizational intervention. Interventions can target policies or structural changes, procedures or group functioning and the individual (Ganster, 1999).

Our recommendations are grouped by the level of the organization on which they focus.

Policy / structural

1. Develop more mechanisms for employee participation and involvement in decision making to address problems identified by our study. Sites can use existing employee groups and bargaining unit groups and can create new employee involvement teams as needed.
2. If future downsizing or other significant organizational changes are anticipated, devote even more resources to developing processes and policies that emphasize clear and consistent procedures, and open, timely, and honest communication.
3. Prepare and train managers who must plan or implement a downsizing or restructuring.
4. Engage employees in planning any future organizational change to provide information, help create plans and assist in implementing decisions. Again, existing and new employee groups can be utilized.
5. Develop flexible work schedules to respond to employee concerns about workload, work demand, poor work-home balance and long commute.
6. Review and, if necessary, work with existing systems to address employee-management problems, as well as complaints about unfair organizational or downsizing practices.[50]
7. Examine employee policies and the organizational climate to ensure that there are sufficient deterrents to discrimination and bias in the workplace.
8. Assess ways to enhance contractor relationships with the local Department of Energy representatives as well as workplace safety as these areas were protective of employee health and functioning.

Procedures / group functioning

1. Establish mechanisms to closely monitor work demands and elements of job control, particularly immediately following significant changes to a work unit or to the site.
2. Offer training for managers on: effective supervision, providing support, communication styles, communicating respect, and listening skills, etc.
3. Involve work groups in identifying stressors and ways to address them.
4. Establish teams to enhance the factors shown to be associated with better employee morale including social support, better communication and effective conflict resolution.
5. Provide employee training on workplace diversity and the impact of harassment or discriminatory treatment on individuals and the work environment.
6. Determine whether climate or other physical changes for a group will assist with an employee's ability to get his / her job done.
7. Establish programs that encourage employees to respond to workplace change openly (e.g., seminars that target survivor syndrome and other noted responses to change).

[50] While a dispute resolution system is a structural response to workplace issues, in its implementation it can either focus on the individual and single cases or cases can be viewed in their entirety as a way to understand systems issues.

8. Allow managers and employees to assess whether a matrixed work structure is operating effectively or, alternatively, is contributing to employee stress.

Individual level interventions

1. Work with employees to analyze and, if needed, improve the design of jobs or workstations.
2. Implement stress reduction or exercise sessions.
3. Provide sessions for people who have to implement the downsizing.
4. Allow for employee input into the design of one's day and approach to work tasks.
5. Establish clear, non-discriminatory policies for EAP participants.

In addition to our research findings, many studies have documented the link between job strain and cardiovascular disease. A recent study looking at changes in psychological distress during a two year downsizing process identified co-worker support and job influence as protective factors and higher job insecurity, strain and role ambiguity as contributors to psychological distress (Woodward, et. al., 1999). This indicates, for example, why it is important to address those variables that contribute to job insecurity as they may also result in negative psychological health effects. Indeed, at LANL we noted overlap in the variables that were predictive of job insecurity and associated with one or more of the three psychological health outcomes, particularly downsizing experiences, job strain, and a matrixed work structure.

On the policy level, a recent study documents that over the course of a downsizing event hospital personnel reported worsening perceptions of the quality of patient care and the hospital's commitment to quality care and quality improvement, as well as more negative perceptions about their employer and management-employee relations (Woodward, et. al., 1999). These findings suggest the importance of leadership and attention to management-employee relations during times of structural change.

- **EAP programs can do more to mitigate poor mental health outcomes.**

Information collected about the employee assistance program coupled with findings of vulnerability to stress during times of organizational change provides direction for EAP programs. Interventions aimed at mitigating poor mental health outcomes must:

- work with those implementing the downsizing to ensure that procedures and interactions are perceived as fair and consistent;
- target the susceptible employee population (and those with most direct impacts) including those implementing downsizing and work units that have been restructured or where people have seen many colleagues laid off;
- involve the at-risk worker population to develop and implement workshops; and
- introduce programs and workshops early on in the workplace change event.

A complicating factor in using EAPs as a resource during workplace change, particularly at DOE sites, is that employees may be reluctant to seek mental health services for fear of losing security clearance. Some sites, like Pantex and Y-12, have chosen to use off-site EAP providers to disassociate the service from the site (DOE will

still go to the EAP to check mental health histories as threats to national security). It may be useful for DOE and contractors to clearly communicate the policies regarding seeking mental health services and renewing clearance.

## XC. Next Steps

- **Boston University School of Public Health can develop intervention programs to address research findings.**

A workplace intervention project designed to reduce employee stress and improve health and workplace functioning can be approached in several ways. Boston University School of Public Health proposes to work with one of the study sites to develop such an intervention project. The intervention will address key factors at the identified site that appear most related to negative health and organizational outcomes and will promote factors identified as protective to individual health and organizational functioning. The intervention will include comparison groups and have a strong evaluation component.

An intervention model that has been identified as particularly successful in achieving positive outcomes is the participatory model. Companies are increasingly turning to employee teams to address workplace concerns, acknowledging the high quality decisions and the likelihood of follow-through. Stakeholder involvement leads to greater commitment and therefore likelihood of higher participation as well as interventions that are more suited to a particular group given the participation of local experts (Lawler III, 1986; Israel, et. al., 1986; and May and Schwoerer, 1994).

In such a participatory model, teams of employees review the findings and help to create interventions and solutions best suited to their workplaces. An employee involvement approach may help a site to avoid the sense that management is simply trying to figure out ways to lay off individuals in a more efficient or cost-effective manner, but rather is trying to improve quality of work life, job control and health and safety.

Each intervention element must be: 1) grounded in research findings from this and other studies; 2) linked to a theoretical construct (with expected target behavior or perception identified); 3) specific in scope and target; and 4) coupled with expected changes and means for measuring those changes. It is possible that some structural or policy interventions will be developed outside the scope of these teams to be implemented in one or more of the experimental groups.

## XD. Topics for Further Inquiry

Several areas for additional research emerged from our study. Some of the areas for further inquiry are listed here.

- **Theoretical**
    - Understand the natural history of the effects of downsizing and other organizational change on health using a longitudinal study design.

- Understand the phenomenological issues of naming and classifying the elements of organizational change.
- Explore the statistical relationships between perceived fairness of the downsizing process and health and organizational functioning in a longitudinal study.
- Conduct further interaction analyses looking at whether the downsizing fairness scale (instead of downsizing rate) interacts with other variables in influencing the health and organizational related outcomes.

- **Methodological**
  - Develop new measures of downsizing and decisions about how to classify individuals who may, for example, retain a job but be shifted to a new employer (e.g., is this someone who has been downsized or is this a survivor?).
  - Develop ways to measure organizational restructuring and other changes.

- **Multi-level Intervention**
  - Test hypotheses about the importance of voice, control and communication and role of union membership using an intervention model.

- **Outcome Issues**
  - Test the impact of downsizing and other changes on usage of medical and EAP services and estimate the impact of these changes on employee psychological and family concerns.
  - Determine and understand barriers to using EAP counseling.
  - Develop a better way to identify and measure incidence of violence and harassment.
  - Develop and implement a monitoring program to identify discrimination.

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