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Kettlitz, Gary Russell, The Validity of the Weighted Application Blank as a Predictor of Tenure in the Nursing Home Industry: A Test of Two Models. Doctor of Philosophy (Personnel and Industrial Relations), May, 1993, 167 pp., 11 tables, 16 illustrations, bibliography, 95 titles.

High levels of turnover in the nursing home industry have a serious negative impact on administrators and residents alike. While a constant influx of new employees places increased demands on administrators' ability to maintain cost and quality control, the negative implications to the residents can be more far-reaching. Research supports this contention, indicating that turnover has a negative effect on residents' realization of high quality care, as well as their ability to develop adequate interpersonal relations. Nonetheless, estimates indicate annual turnover rates as high as 75 percent for registered nurses and 400 percent for nursing assistants, with average annual rates in excess of 55 percent and 145 percent, respectively.

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rigor can reduce the frequency of type I and type II errors in the weighted application.

The target population was a nursing home chain within the four-state region of Iowa, Kansas, Missouri, and Nebraska. A sample of 288 applications was randomly selected, with 142 from long-tenured employees (employed six months or longer) and 146 from short-tenured employees (employed three months or less).

The test conducted with respect to Hypothesis 1 indicated that the weighted application is significantly better at predicting tenure than the corporation's currently used strategy. Respective of Hypothesis 2, the McNemar test revealed no difference existed between the predictive accuracy of the weighted application developed using the chi-square and discriminant method and the weighted application developed using the Mann-Whitney U and regression method.

THE VALIDITY OF THE WEIGHTED APPLICATION BLANK AS A PREDICTOR OF TENURE IN THE NURSING HOME INDUSTRY: A TEST OF TWO MODELS

DISSERTATION

Presented to the Graduate Committee of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

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CHAPTER I

INTRODUCTION

Reports indicate that turnover costs American industry in excess of $11 billion a year (Employee turnover: Measurement and control 1987). This figure reflects expenses incurred through the recruitment, selection, orientation, and training of replacement personnel, as well as costs associated with ancillary administrative functions. Estimates reflecting the cost of replacing an employee range from $1,500 to fill a non-exempt position, to as much as $1 million for a jet fighter pilot (Cascio 1987, Wanous 1980). As such expenses have continued to rise, employers have become increasingly aware of the negative economic implications associated with employee turnover (Cascio 1987, Mobley et al. 1979).

Since turnover can be a symptom of ineffective selection procedures, it is not surprising that selection processes have been a focal point of industrial psychologists for many years (Dunnette, Arvey, and Banas 1973, Lawrence et al. 1982, Wanous 1980). And, while all organizations are affected by turnover to a greater or lesser extent, service oriented organizations suffer most

from inadequate measures to control turnover because of their labor intensive nature. One such industry is the long-term care, or nursing home industry, where high rates of turnover have continually plagued administrators. Surprisingly, reviews of past and current research indicate that little has been done to assess the potential to improve the recruitment and selection processes in this industry.

The Long-Term Care Industry

Nursing homes provide long-term health care to ambulatory and non-ambulatory, typically elderly, individuals. The dominant form of service provided these individuals involves primary health care support, with aides and orderlies performing the vast majority of such duties. Activity, housekeeping, dietary, and nursing personnel comprise the balance of the facility's on-site staff.

Predominantly, aides and orderlies are expected to provide for the residents' maintenance needs, including personal hygiene, nutritional, and medical services. In addition, they are the primary, and sometimes only, group of individuals available to satisfy the residents' psycho-social needs.

Many of psycho-social needs are extremely important facets of life, directly related to individual health and well being. Included among these needs are factors such as

emotional support and intellectual stimulation. Complicating the employees' ability to provide for such needs is the fact that many nursing home residents are severely impaired. Such residents dramatically increase the challenges of providing for the ever important needs. Considering the nature of the task these employees face it soon becomes evident that a stable, well-trained workforce is essential if optimal levels of care and interactive behavior are to be realized by nursing home residents. Research indicates, however, that annual turnover rates are as high as 75 percent for registered nurses and 400 percent for nursing assistants (Fairchild 1982). Average annual turnover rates for these two groups are estimated to exceed 55 percent and 145 percent, respectively.

The constant influx of new and untrained employees has a profound impact on the ability of long-term care facilities to provide optimal care for their residents. Research supports this contention, indicating that turnover has a negative effect on residents' realization of high quality care and their ability to develop adequate interpersonal relations (Fairchild 1982). Considering the serious implications of turnover in this environment, and the high costs associated with the replacement of employees, it is surprising that little research has been conducted

which addresses specific methods of improving the selection processes used in nursing homes.

Statement of Problem

The problem addressed in this study is the inability of nursing home personnel responsible for hiring decisions to identify and select nursing aides and orderlies who will remain with the organization. The resulting turnover negatively impacts the ability of long-term care personnel to provide high quality care to their elderly residents.

Purpose of Study

This study was designed to serve two purposes. The first was to determine whether use of a weighted application blank has the potential to improve the selection of employees in the nursing home industry. The weighted application blank is a well known, easy to use, and cost effective selection procedure--its efficacy having been validated when used with both exempt (managerial) and non-exempt (line worker) positions. The use of weighted application blanks is, in essence, a proactive approach to reducing turnover. However, no evidence was found to indicate the procedure has been used in the nursing home industry.

As such, a weighted application blank was tailored to the nursing home industry, where it had not been applied in

the past, to ascertain whether the instrument could effectively improve the selection process. This approach is directly related to the promotion of longevity among aids and orderlies, with potential implications toward enhancing levels of commitment to the organization and the residents.

The second purpose of this study was to determine whether a new strategy for developing a weighted application blank can improve the predictive validity of the weighted application blank (this follows the work of Smith and George 1987, and Smith, Smith, and George 1988). To accomplish this, two different weighted application blanks were developed, one using chi-square test of independence and discriminant analysis, and the other using Mann-Whitney U and regression analysis. Specifically, the frequencies of Type I and Type II errors were compared. As such, the technique were examined to determine whether scaling can improve the statistical accuracy of the measures used to predict criterion related validity.

Significance of Study

This study was designed to provide an important and meaningful contribution to both the nursing home industry and the theoretical foundations of the field of human resource management. The basis for such a contribution is twofold. First, as mentioned earlier, the use of the

weighted application blank has not been tested in the nursing home industry. This has significant implications to both the industry and the field of human resource management.

Respective of the nursing home industry, an effective, proactive approach toward reducing the rate of turnover has positive implications for both the corporations using the procedure and the residents receiving care at such facilities. Because weighted application blanks have been used successfully in many industries, the potential benefits, when used in nursing homes, are significant from two perspectives. The first relate to the positive implications of a reduction in turnover, and the second to the value of a quantitatively based selection device that is valid, and can withstand the scrutiny of the courts.

In addition, the field of human resource management is largely responsible for research and development associated with selection standards and strategies. Through this research, information currently unavailable is added to the theoretical framework--a direct outcome being an enhanced understanding of the complex nature of employee selection procedures. Stemming from this are secondary benefits generated through additional avenues for exploration and further research.

A second area of contribution concerns the methodologic development of the tool, which identifies potential strategies for improving the validity of weighted application blanks. Several benefits are realized through this effort.

First, by improving the validity of the weighted application blank, companies gain greater leverage in the justification of their hiring decisions--especially important in light of equal employment opportunity guidelines. Second, enhanced levels of validity are directly related to selection procedure accuracy with respect to Type I and Type II errors. Any improvement in this area has direct and positive impact on the reduction of employee turnover. It is assumed that such a reduction can provide a greater "fit" between the individual and the organization. Third, such an undertaking heightens the current position of human resource management. The empirical nature of this portion of the study adds to the current trend in human resource management toward substantive statistical rigor in the validation and justification of various tests used in employment decisions.

Limitations of Study

One major limitation of this undertaking concerns the issue of external validity. The method used to identify the

corporation for use in this research limits the implications of the study. This is due to the fact that it constitutes a convenience sample, rather than one developed through random selection strategies, in which the sample would have been drawn from the entire population of available nursing homes.

Another potential threat to the validity of this study involves the accuracy of application blank data. It is widely accepted that false and misleading information is frequently provided by applicants. While nothing can be done to control for this possibility, it is important to recognize the role incorrect data can play as an intervening variable. Additional information regarding this phenomena is presented in the section on reference checks.

Hypotheses

Two hypotheses are tested in this research. The first hypothesis is: Weighted application blanks will identify a higher percentage of individuals who will remain with the organization than the current experience. As such, the formula for the null hypothesis is: H_o: $\hat{P}_1 = \hat{P}_2$, where $\hat{P}_1$ is the percentage of individuals correctly classified by the weighted application blank system, and $\hat{P}_2$ is the percentage of individuals correctly selected under the current experience. This indicates no difference in the accuracy of the two strategies.

The turnover rate for a one year period, January 1, 1991 to December 31, 1991, was used as the surrogate measure used for $\hat{P}_2$. This rate, reported by the president of the corporation, is 171 percent, with an employment base of 1,100 aids and orderlies. The success rate for the current experience is therefore 37 percent.

The alternate hypothesis is: H_a: $\hat{P}_1 > \hat{P}_2$. Rejection of the null hypothesis, then, indicates a statistically significant improvement in reducing selection error through the use of the weighted application.

The second hypothesis is: By scaling the data and using Mann-Whitney U to screen significant items for ordinal, interval, and ratio data in conjunction with the chi-square test of independence (for nominal data), followed by stepwise regression to develop item weights and the final prediction model, the percentage of individuals correctly classified by the experimental weighted application blank will be greater than those correctly classified using the currently accepted weighted application blank strategy.

The null hypothesis is: H_o: $\hat{P}_3 = \hat{P}_1$, where $\hat{P}_1$ represents the percentage of correctly classified individuals using the weighted application blanks developed using chi-square and discriminant procedures, and $\hat{P}_3$ represents the percentage of individuals correctly classified using Mann-Whitney U and stepwise regression.

The alternate hypothesis is then: H_a: $\hat{P}_3 > \hat{P}_1$ which indicates that the experimentally developed procedure yields a significantly higher percentage of correctly classified individuals than the current experience. That is, the approach described for $\hat{P}_3$ is significantly better than that described for $\hat{P}_1$ when the null hypothesis is rejected in favor of the alternate.

Summary

The high level of turnover experienced by many nursing homes may be a symptom of poor selection procedures. This research was designed to determine the viability of an alternate selection procedure, the weighted application blank, toward the reduction of Type II errors currently experienced by the participating corporation. In addition, a test was performed to determine whether more rigorous statistical procedures would improve the accuracy of the weighted application as currently developed. The following chapter provides an in-depth review of the literature pertinent to selection procedures, and provides the foundation for the development of the weighted application blank.

CHAPTER II

LITERATURE REVIEW

Introduction

This chapter provides a review of past and contemporary literature related to employee selection and appropriate procedures. It begins with a review of the legal implications of selection procedures and associated implications of reliability and validity. It is imperative that all employment decisions adhere to the stringent guidelines established through legislation and court precedent. Organizations must be able to fully support their hiring practices if they are to avoid equal employment opportunity lawsuits. Therefore, all selection procedures must be developed with great deference to the prescribed guidelines.

A review of literature and research concerning various selection procedures used in contemporary industry is provided in the nest section. Included is pertinent information regarding the reliability and validity of various selection strategies--which are essential elements in determining the appropriateness of using said devices in the selection process, and the capacity to justify such use.

Legal Implications of Selection Procedures

The genesis of labor laws and the precedents set by ensuing court cases have had a tremendous impact on the efforts of organizations and particularly, human resource specialists, to adhere to procedures that do not violate equal employment opportunity laws and to validate all employment decisions. From the inception of the Civil Rights Act of 1866, which made discrimination based on race illegal, to the recent passage of the Americans with Disabilities Act, employers have been faced with an increasingly difficult burden when addressing issues of labor law (Player 1992).

An analysis of guidelines established for employers as they confront related employment issues is provided by Mary and John Miner as a preface to the Uniform Guidelines on Employee Selection Procedures. This comprehensive text addresses employer responsibilities in decision processes affecting potential and current employees. In the analysis, Miner and Miner identify four general guidelines to follow.

First, they indicate that the overall selection process should be assessed for evidence of disparate impact using the four fifths rule (the four fifths rule is described in Executive Order 11246 and relates to the ratio of minority/majority applicants hired as a function of those who apply). The second guideline identifies the fact that

if disparate impact is evident, the employer has a responsibility to investigate and identify the cause. Third, any practice proving to have adverse impact should be eliminated, changed, or proved to be job related. Such job relatedness must be validated through appropriate techniques. And forth, validity studies should investigate suitable alternatives, and the alternative having the least adverse impact should be adopted (Uniform Guidelines on Employee Selection Procedures 1979, 1). These guidelines apply to all personnel related decisions, including hiring, advancement, wage increases, and involvement in training programs.

Validity of Selection Procedures

The validity of a selection tool relates to the accuracy with which a particular device predicts an individual's ability to perform specific facets of job performance (Anastasi 1976, Dunnette 1976, Hay 1953). As described by Ivancevich and Glueck (1989), validity is externally referenced. This indicates that validity is a process whereby a predictor correlates to some ancillary measure of performance, and not to the internal efficacy of the tool itself. Current case law complicates this notion and has, as such, promoted substantial interest in the

pursuit of information regarding the complex nature of validity (Ballew 1987).

In an effort to promote an understanding of this process, Cascio (1991) synthesized a list of eight important guidelines to consider when dealing with the scientific and legal aspects of selection procedure validation. An important and useful feature of Cascio's guidelines is that each is cross-referenced to the specific sections of the Uniform Guidelines on Employee Selection Procedures (1979) from which they were derived. In general, Cascio recommends in the guidelines that selection specialists and other responsible parties in organizations be prepared to (1) identify the purpose of the selection procedure; (2) provide a rationale for the validation strategy selected; (3) justify how, and why, specific jobs were selected for inclusion into the validation study; (4) identify existing procedures and describe how they have been used; (5) advance appropriate rationale if criterion-related validation is claimed to be technically unfeasible; (6) justify why a test cannot, or need not, be validated; (7) provide records of data that has been, or could be, used in a criterion-related validity study; and (8) indicate what has been done to promote a more formal, quantifiable, selection procedure.

Considering these points from a human resource management perspective, three major validity issues can be

identified as essential if fair and effective employment decisions are to be made. As classified in the Uniform Guidelines on Employee Selection Procedures (1978), the three issues pertain to content, construct, and criterion related validity.

Content validity is a measure of the degree to which a predictor (typically some type of test) measures the knowledge, skills, or abilities required of an individual for the successful performance of a job (Guion 1965, Ledvinka 1982). Blum and Naylor (1968) describe the essence of content validity as a given type of predictor which is representative of a specific set of situations. This is the principle behind work sample tests. For example, a typing skills test is content valid when used to predict the performance of a secretary whose job involves extensive typing. Requiring candidates for a truck driving position to perform driving skills tests using the actual trucks to be driven would also be a content valid test. It should be noted that nothing inherent in these examples makes any inference to the level of typing or driving proficiency required. The level of proficiency is an issue of the establishment of cutoff scores which, for the examples provided, are developed through the use of general industry standards. In many instances, however, derivation of cutoff scores becomes extremely complex. Because of this, a

significant body of collective research and case law has emerged that directs companies to adhere to separate validation issues related to the establishment of cutoff scores (Cascio, Alexander, and Barrett 1988).

In addition, companies must recognize that the Uniform Guidelines on Employee Selection Procedures (1979) does not sanction the use of work sample tests over performance criteria that can be learned in a short period of time. While content valid tests are relatively straight forward, identification of construct validity is a much more rigorous process, sometimes involving the identification of intangible psychological traits (Ghiselli 1964).

Construct validity is the degree of accuracy to which a test, as a whole, measures specific, abstract psychological traits and characteristics (constructs) (Anastasi 1983, Cascio 1991). Such constructs include job satisfaction, motivation, intelligence, commitment, and a plethora of other facets of individual behavior. Some authors contend that this type of validity is the most difficult to develop and defend in court (Carrell, Kuzmits, and Elbert 1992). Cascio (1991) furthers this notion, purporting that construct-related validity cannot be determined through isolated study, but must be represented by the aggregation of supporting evidence from various sources. As such, the process imparts both logic and empiricism.

Korman (1971) indicates that when a tool is to be used for predictive (employment related) purposes, the process of construct validation is actually a dualistic process of measurement. First, the researcher must have accurate determinations of both the reliability and validity of the test in the prediction of the specific construct in question. The second measurement phase in this dualistic process is the application of such a test in the prediction of specific work-related performance. Here, the tool must undergo the rigors of a criterion-related validity study to determine if a direct relationship actually exists between test scores and employee performance.

Criterion-related validation pertains to the ability of a device to predict individual performance levels with respect to a particular task. It is actually a measure of the correlational relationship between the predictor and tangible, job related criteria which are indicative of job performance (Cascio 1991, Ghiselli 1964, Wanous 1980). The measure, typically referred to as a correlation coefficient, assesses the degree of association between the variables.

Frequently evaluated as an $\underline{r}^2$ value (coefficient of determination), the statistic indicates the percentage of variation in a given variable that is explained by the other correlated variable. So, for example, an $\underline{r}^2$ value of .9

signifies that 90 percent of the variance of the item variables can be explained through the correlation.

Maier (1973) contends that a selection instrument with an $\underline{r}^2$ value of .64 improves the selection process by 60 percent, while an $\underline{r}^2$ value of .36 improves the selection process by 40 percent. No reference is provided, however, to the sample size needed to place confidence in the stated levels. Guidelines for the determination of adequate $\underline{r}^2$ values are dependent upon sample size. For example, at the .01 level of significance, an $\underline{r}^2$ value of 1 (perfect correlation) is required if the sample size is three. If the sample is fifty, a coefficient of determination of at least .3000 is necessary. Arvey and Faley (1988, 21) provide additional information, and a table of $\underline{r}^2$ values as a function of sample size, in their text Fairness in Selecting Employees. This is an extremely important concern and should be carefully studied by the researchers.

A second factor of importance in the statistical assessment of a correlation is the statistical significance of the relationship, which indicates the degree of probability that the relationship under consideration has occurred by chance. The Uniform Guidelines (1979) indicates that a statistically significant relationship exists when a test reaches the .05 level of significance. At this level there is only a one-in-twenty probability that the

relationship exists by chance. When properly conducted, these statistics can provide a high degree of certainty that an item is related to one of the two criterion groups.

Reilly and Chao (1982), in aggregating and summarizing published data concerning the validity of various selection procedures, identify significant and positive implications associated with selection procedures validated using criterion-related strategies. They note that strong links exist between specific, job-related performance and selection tests involving intellectual ability, spacial and mechanical ability, perceptual accuracy, motor skills, and personality traits. Further evidence provided in their review indicates that tests exhibiting a high degree of criterion-related validity are also highly generalizable to other environments. This infers that tests found to be valid from a criterion-related perspective may be applied consistently in industries other than those included in the original validity study. It must be noted, however, that extreme care should be taken to ensure the characteristic being measured is an essential facet of the job in question.

Two strategies have been identified for researchers to use as guides in determining the strength of the link between a specific predictor and the job related criterion of performance. These are referred to in the Uniform

Guidelines (1979) as concurrent and predictive strategies for criterion-related validity.

Concurrent criterion-related validation strategies employ the use of individuals currently employed in an organization for determining the effectiveness of a predictor. In this process, the predictor is administered to employees--either the entire employee population, if possible, or a random, representative sample of the population. Results are correlated to some performance measure already compiled for other purposes, such as employee evaluations. The key to this strategy is that performance-related information must be available at the time the prediction device is administered.

Predictive criterion-related validation involves the administration of a prediction tool to all applicants, at a point in time prior to the collection of performance data. Individuals are selected using other, currently practiced strategies, irrespective of their scores on the device in question (Ledvinka 1982). At a later date, performance data are collected and a correlational study is conducted. While some suggest that neither predictive nor concurrent criterion-related strategies are preferred over the other (see, for example, Ballew 1987), published materials related to this matter indicate that this notion may be incorrect,

revealing serious concerns regarding the use of concurrent strategies.

Stone and Ruch (1974) identify a significant problem with concurrent criterion-related validation strategies. If one uses information concerning current employees, and the company in question has a history of past discriminatory practices, the potential exists to construct differential selection processes which validate discrimination (Kirkpatrick et al. 1969, Stone and Ruch 1974). Schmidt and Hunter (1980) identify this as situational specificity in single group validation studies. This brings about the procreation of discrimination since the true population validity is zero for protected individuals but significant for the non-protected group. This is actually a consequence of developing validity based on current levels of performance rather than on levels of performance necessary for entrance into the position. This concern is addressed directly in the Uniform Guidelines (1979), and is controlled for by using predictive validation strategies (Arvey and Faley 1988).

Two major drawbacks to the general use of predictive validation strategies exist (Ivancevich and Glueck 1989, Scarpello and Ledvinka 1988). First, many organizations and researchers lack sufficient time and resources to devote to a study that is longitudinal in nature. Second, when

applicants are required to perform in a testing situation, as with predictive strategies, they sometimes suffer from high levels of anxiety that are not experienced under "normal" conditions. This can cause them to perform poorly on the predictive instrument, thereby providing the potential for Type I (false negative) error. It is important to note that both strategies have certain limitations which must be recognized.

Relating this to the earlier discussion of construct validity, it must be stressed that neither criterion-related validation strategy can be utilized unless the tool in use is proven to be reliable and valid in-and-of itself. That is, the measurement instrument must provide consistent results over time, and must accurately predict the specific construct. These concepts are the foundations by which employment decisions are justified and an organization can defend itself against accusations of discriminatory practices. Personnel specialists must be aware of all potential implications, especially those affecting employee selection. Further information concerning issues of validation is provided in Principles for the Validation and Use of Personnel Selection Procedures (1980), published by the American Psychological Association.

Employee Selection

The selection of competent employees is a major concern of any organization. As indicated earlier, erroneous selection decisions are costly to organizations because they contribute to high turnover rates. In fact, the selection process has many important implications to an organization. Included among these are the effects of employee selection on orientation and training time, job performance, and organizational efficiency (Rynes and Milkovich 1986). Further, effective selection procedures provide an organization with individuals who not only remain with the organization, but, as espoused by Katz and Kahn (1966) who will also do more than is expected of them by exhibiting creative, innovative, and spontaneous behavior directed at promoting the efficacy of "their" company.

Many factors exist, however, which can cause personnel responsible for the final employment decisions to make errors in their choice of the best candidate for the job. When such errors occur, they are classified as Type I and Type II errors. The notion of Type I and Type II errors is of particular concern when considering quantitative selection processes, because it forms the basis for the validation of such tools.

The identification of an individual as a poor job candidate when, in fact, he or she posses the necessary

personal attributes and skills, constitutes a Type I error. Type I errors can be considered as costs due to lost opportunity. The identification of an individual as a potentially strong job candidate when, in fact, he or she does not posses the necessary personal attributes and skills, is a Type II error. Complications also arise when contemplating the legal ramifications brought about through various civil rights laws such as Title VII of the Civil Rights act and the Vocational Rehabilitation Act of 1973. Many strategies and techniques have been developed, however, which help personnel specialists and managers enhance their ability to select competent employees and avoid related problems.

Techniques and Strategies Used in Employee Selection

Advancements in selection procedures have provided many tools to enhance the process of employee selection. Nonetheless, the first step in any selection process is the development of a clearly defined set of hiring criteria relevant to the job (Arvey 1979, Scott 1981, Wanous 1980). Information pertinent to this process can be obtained from accurately developed job descriptions and specifications. These tools, developed from job analyses, provide information relevant to the specific duties performed by

incumbents, as well as the minimum required knowledge, skills, and ability to perform such duties.

Recruiting individuals to apply for the position is the next step in the process. This step is just as dependent upon identification of objective criteria as the selection process itself, since it helps reduce the potential for selection error. Once individuals are recruited, the actual selection process can begin.

Among the many strategies used to improve the selection process, are the evaluation of information collected through the completion of application blanks, employment interviews, reference checks, weighted application blanks, and medical examinations. In addition, employment tests, which include intelligence tests, job knowledge tests, assessment center testing, physical abilities tests, personality tests, and various other types of psychological tests are used to help improve selection decisions (Maier 1973). A plethora of lesser used techniques exist, including graphology, honesty tests, and polygraph tests, although recent court rulings significantly limit their use.

In a study of selection techniques used in 437 United States firms, the Bureau of National Affairs (1983) reported that 355 of the firms (81 percent) used unstructured interviews. Forty seven percent used some form of structured interview when hiring an individual from outside

the firm. In addition, 97 percent of the firms used reference checks, 75 percent used performance based work samples tests, 22 percent used job knowledge tests, and 20 percent used mental ability tests. Personality tests were reportedly used by 9 percent of the firms, while 6 percent of the companies used assessment centers, physical abilities tests, and polygraph or written honesty tests. Surprisingly, only 11 percent of the firms reported using weighted application blanks in their hiring process, even though they have been described as an efficient, cost effective, and valid procedure for employee selection (Lawrence et al. 1982). The following discussion provides a review of these techniques.

Application Blanks in the Selection Process

A vast majority of all firms use some type of application blank in the selection process (BNA 1983). Typically, they use one of a number of standardized forms requiring information such as the individual's name, address, telephone number, position desired, source of referral, previous employers, and references. A standard employment application usually requests from fifty to sixty individual pieces of information.

Application blanks are reportedly the most common source used to obtain background information from

perspective employees (Scarpello and Ledvinka 1988). This issue has received much attention recently, as new information concerning the accuracy of such data has emerged. Schmitt (1976) reports that a follow-up study of five application blank items from 111 applicants revealed significant discrepancies. Seventy-two percent of the salary levels reported by applicants were found to be inflated, 57 percent of the individuals falsified the length of time they were employed in various positions, and 15 percent of the applicants listed companies as past employers when they had actually never worked for the firms. In light of these findings, it is imperative that organizations recognize the importance of verifying the accuracy of information presented in application blanks. With the introduction of new legislation supporting individual rights to privacy, this becomes a major task. In addition to being used as a selection device, applications also serves to provide information used in the employment interview, a major employment strategy of American firms.

The Interview as a Selection Tool

In 1930, researchers estimated that 93 percent of American firms used employment interviews in their selection process (Spreigel and James 1958). By 1957, this figure had increased to 99 percent of the firms surveyed. In

contemporary society, the interview continues to be the primary tool used in the selection of employees (BNA 1983). According to information cited by Milkovich and Boudreau (1988), 90 percent of the firms responding to a survey indicated that they place more confidence in the employment interview than any other selection method. A survey by Mankin and Robertson (1986) provides support for this finding. They note that the interview, when used in conjunction with reference checks, is the most widely used technique by businesses. In comparing the efficacy of the interview against tests and biographical data sheets, however, Mankin and Robertson found that the interview had little validity for selection purposes. This is not surprising when one considers the vast amount of research which attests to the many problems inherent in this selection strategy.

Milton Hakel (1982), well known for his research of the interview process as a selection method, provides diverse evidence of the many problems and sources of invalidity in the process. In his commentary, Hakel identifies problems with the fairness, cost utility, task difficulty, and random nature of the interview. In addition, he reports that the order of favorable and unfavorable responses, nonverbal cues, gender, age, attitudinal similarity, and physical

attractiveness all affect rater judgement in the interview process.

Mandell (1952) contends that the basic problem encountered with interview validity is that it involves the extensive use of subjective inference concerning information collected in an artificial environment. He argues that such processes are typically conducted by inexperienced, unskilled individuals, thereby increasing the subjectivity of the technique. Research cited by Mandell indicates that sources of invalidity range from poor judgmental ability of interviewers to direct prejudice.

In general, research indicates that interviewers are often influenced by non-performance related factors, including subjective biases, prejudices, and stereotypes. What most organizations do not recognize, however, is that the use of interviews is subject to the same validation rigors as any other selection method.

If an applicant were to establish a prima facie case, the use of the employment interview would be scrutinized for both reliability and validity, just as any other test (Arvey and Faley 1988). As set forth in the Uniform Guidelines on Employee Selection Procedures (1979, 21), Section 3a,

> [A] procedure having adverse impact constitutes discrimination unless justified. The use of any selection procedure which has an adverse impact on the hiring, promotion, or other employment or membership opportunities of members of any race,

> sex, or ethnic group will be considered to be discriminatory and inconsistent with these guidelines, unless the procedure has been validated in accordance with these guidelines.

In a review of the discrepancies and sources of invalidity in the interview which have been reported since 1915, Mayfield (1964) cites well over fifty articles assessing the validity and reliability of the interview. Mayfield concluded, in general, that the interview, as understood at the time of his writing, lacked substantive credibility and needed for further research. Since 1964, a profusion of literature has surfaced which points to the shortcomings of the interview method.

For example, Zedeck, Tziner, and Middlestadt (1983) assessed the validity and reliability of interviewer decisions in the selection process and found interesting results. The interviewer decision was determined to have no predictive validity with respect to on-the-job performance. Their findings support the results of a study by Schmitt (1976) in which the situational determinants of interviewer decision-making processes were found to significantly influence the outcome of interviews.

In a review of research pertinent to the interview process, Arvey and Faley (1988) present findings which add further skepticism to the validity of interviews. They report that, in many instances, judgments concerning the job

suitability of an interviewee are made within the first four minutes of a fifteen minute interview. This leads one to believe that the opportunity to base judgement on concrete information is circumvented by subjective assessments on the part of the interviewer.

In addition, research indicates that one unfavorable response can negate the weight of any favorable responses (Bolster and Springbett 1961). In assessing the impact of this fact, Arvey and Faley (1988) contend that the interview is more a process of finding reasons to reject a candidate, rather than a process of finding the most qualified individual.

The implications of this contention were alluded to by Bills (1939), more than half a century ago. In a report of research and scientific observation, Bills contends that the interviewee who speaks least, and allows the interviewer to do the majority of the talking, is the candidate who is most likely to be hired.

While many other studies report problems stemming from such factors as the age and gender of both the rater and ratee, rater personality, similarity of traits, and rater inexperience, there is much evidence that the interview process can be a valuable, as well as valid, selection strategy when properly administered. Much of this work is in direct conflict with reported research attesting to the

limitations of the interview process. This is attributed, by Cascio (1991) and others (see, for example, Mayfield 1964 and Ulrich and Trumbo 1965), to the fact that past research was poorly conducted and methodologically flawed. In general, studies designed to control for the many sources of invalidity inherent in such a research endeavor, using properly trained interviewers, have provided strong support for the use of interviews.

A study of the predictive validity of interviews by McMurry (1947) revealed significant positive findings when patterned interviews were used. In this study of 996 individuals selected for employment, a validity coefficient of .68 was reported for individuals receiving high interview ratings and supervisor evaluations. In addition, a correlation of .48 was realized respective to low interview ratings and individuals who left the company within an eighteen month period.

Research conducted by Arvey, Miller, and Gould (1987) provided further insight into the validity of the interview. Two studies, the first involving 312 employees and the second involving 205, were undertaken to assess the predictive nature of the interview with respect to job related performance. For the first, the correlation between interview score and performance was .42, while the predictive ability of rater scores for the second was .61.

This provides a high degree of credibility to the interview as a selection device. Using regression analysis, the researchers provide evidence that the process was not impacted by interviewee age, gender, or other moderating factors.

Many other studies have shown significant levels of validity with respect to inter-rater reliability, as well as significant predictive validity (see, for example, a review of such research in Blum and Naylor 1968, Hakel 1982, and Mayfield 1964). It should be noted that the vast majority of studies supporting the validity of interviewing focus on the use of structured interviews. This has major implications for human resource specialists and places emphasis on the need to use accurate job analysis, descriptions and specifications in the interview selection process.

Careful development of patterned interview techniques can greatly enhance the validity of the selection stage of the employment process. It is important, nonetheless, to identify several criteria and develop a comprehensive selection system. As noted earlier, many firms use interviews in conjunction with reference checks. While this is a common practice, evidence suggests that employee references have little value in the prediction of successful performance on the job (Caruth, Noe, and Mondy 1988).

The Use of Reference Checks in Employee Selection

The use of reference checks has obvious limitations. Most obvious among these is the probability that an individual will list an employer as a reference who will provide a bad recommendation. It is a well documented fact that a number of individuals (estimated to be between 7 and 10 percent of all applicants) bias, and actually falsify, their background information in the hope of securing employment (Rickard 1981).

In addition, organizations are becoming increasingly aware of the potential legal complications that can arise from providing such recommendations. As reported by Arvey and Faley (1988), American Bank of Commerce lost a lawsuit filed by a former employee when information supplied by the bank kept the individual from securing employment. Although the information provided in this case was not work related (the individual had filed sex discrimination charges against the bank and this information was included in a written recommendation), many companies are still reluctant to provide any information in writing, preferring to give information over the telephone. Nonetheless, many question the validity of reference information regardless of its nature and origin (Von der Empse and Wyse 1985).

In a series of studies conducted by Mosel and Goheen little evidence was found to support the validity of information related to reference checks. The first of these studies (Mosel and Goheen 1958) involved the use of the Employment Recommendation Questionnaire. Using a sample of 1,193 civil service personnel spanning twelve occupations, the researchers, using an unidentified correlational procedure, found no significance in the relationship between Employment Recommendation Questionnaire scores and supervisor-rated performance. The second study involved the predictive ability of the Employment Recommendation Questionnaire compared to that of field investigations (in the form of structured interviews with both the applicant and individuals familiar with the applicant). Based on a sample of 109 applicants for three professional positions, the use of references was found by Goheen and Mosel (1959, 297) to be "notably unable to detect some of the extremely disqualifying features revealed by the investigation report."

In the final study of the series, which was designed to test the validity of different types of references used for the Employment Recommendation Questionnaire, the researchers correlated the relationship between reference source (acquaintance, subordinate, supervisor, personnel officer, coworkers, and relatives) and later job success (Mosel and

Goheen 1959). Of all the relationships tested, only acquaintance and supervisor reference types showed a significant relationship to actual performance. The authors note that the relationship of the two, while statistically significant, was very small.

While reference checks can provide important information, they should be used with caution, and careful assessment of the validity of the information provided. When resources and related circumstances permit, it is prudent to develop and utilize techniques which are more readily verifiable. One such selection strategy is the work samples test. Considered a content valid technique, work samples tests control for many of the weaknesses present in other subjectively based techniques.

Work Samples Tests

Work samples tests, or job sample performance tests, are considered to be among the more valid predictors of actual job performance (Cascio and Phillips 1979). The reason for this is the fact that the test is a measure of individual performance on an actual task related to the job for which the individual is applying. In essence, as described by the Uniform Guidelines on Employee Selection Procedures (1979), this type of test exemplifies a content valid test.

In an extensive study conducted by Campion (1972), strong support was provided the efficacy of such tests over commonly used pen-and-paper tests such as the Bennett Mechanical Comprehensive Test and the Wonderlic Personnel Test. In Campion's research, thirty-four maintenance employees were given both work samples tests and written tests. Job experts were used to assess and rate the performance of the individuals on the work samples tests. Final analysis of the correlations between the tests and actual on-the-job performance revealed the validity correlation for the work samples test to be .46 overall, while the overall predictive validity of the Bennett and Wonderlic tests were -.21 and -.32, respectively.

The main factor of importance when using work sample tests is in the standardization of scoring and establishment of cutoff scores. Once these levels are set, ensuring compliance with the Uniform Guidelines (1979), with respect to minimum required performance and minimum learning stipulations, an organization can be relatively certain that accurate predictions of performance are being made. This strategy is the essence of assessment centers, where individuals are evaluated by a team of observers while performing specific job-related duties.

Assessment Centers

Frank and Preston (1982) studied the validity of assessment centers and reviewed the legal implications of their use. They concluded, through analysis of court rulings, that when properly implemented assessment centers are a valuable tool for both selecting competent employees and maintaining substantiation of employment decisions in the courts. Slavenski (1986) provides additional insight into the value of assessment centers by reporting the results of a cost-benefit analysis of such a program.

In this study, Slavinski assessed the costs associated with hiring ninety-six individuals through an assessment center. She found that while the use of the assessment center increased the cost per employee hired by $4,000, overall savings, based on costs associated with involuntary separation, exceeded $700,000 in the long run. The use of assessment centers may prove even more valuable in the future as legislation and case law concerning selection procedures, such as mental ability and personality tests, become more complex.

Mental Ability and Personality Tests

As indicated in the landmark case Griggs vs. Duke Power Company (1971), there are many issues other than construct validity when considering the use of psychological tests for

the selection and promotion of employees. Mental ability and personality tests, which comprise the majority of psychological tests used for employment purposes, have received much scrutiny by researchers and practitioners. While mental ability tests are used successfully in certain situations, personality tests are typically thought to possess low validity and reliability when used to predict performance (Mondy and Noe 1990). And, as discussed earlier, these types of procedures are not nearly as valid or reliable as carefully developed work samples tests.

Guion and Gottier (1965) analyzed the validity of personality measures in personnel selection. In this study the authors assessed over one hundred studies conducted over a twelve year period. In all, fifteen different personality tests were used. Cross-validations measures were reported by only ten of the studies assessed, and sixty seven used concurrent rather than predictive validation strategies (As discussed, concurrent validation strategies are generally considered to be inadequate for use where personality measures are used as predictors). Few of the studies reported statistically significant reliability coefficients. Guion and Gottier concluded that many of the tests used were not accurate predictors of on-the-job performance.

It must be stressed that psychological testing can be, and is, used to successfully predict many behavior

types. What becomes important in this process is that individuals responsible for the program fully understand the implications of both construct and criterion-related validities as they relate to the successful hiring of personnel. With this focus, many attempts at developing quantitative tools for both selection and promotion have been developed, encompassing not only the techniques discussed, but also lesser used strategies such as honesty and polygraph tests--a discussion of which would fill volumes of texts. For the present study, however, the effectiveness and development of one technique, the weighted application blank, was explored in order to assess its applicability as a selection tool for use in the nursing home industry.

Weighted Application Blanks

The weighted application blank is a technique used by organizations to differentiate between applicants who have a propensity for success and those unlikely to have such a proclivity. Stone and Ruch (1974) describe the weighted application as an expedient, cost effective, valid procedure for screening application blanks by means of simple scoring. While not necessarily a simple technique, it is one that can be accomplished by most human resource departments.

The premise for the use of weighted applications is that personal history data can be used to identify whether an individual will be successful in a given position. In essence, the technique is used to correlate information provided on the employment application with specific successful and non-successful, job-related behaviors of employees. For instance, insurance companies have long found a correlation between past sales history and the propensity for a new sales representative to maintain a high sales volume. Through the use of such correlations, objective and quantifiable weighted applications can be developed to predict performance respective to the job-related criterion (Lawrence et al. 1982).

Development of Weighted Application Blanks

The initial process of developing a weighted application involves obtaining a sufficient number of applications to form three groups. The minimum number of applications needed is estimated to be 150 (England 1971). The first two groups represent an equal number of applications of individuals who fall into successful and non-successful criterion groups (the identification of criterion groups is addressed later in this section). These are kept separate and analyzed using statistical procedures also discussed later in this chapter. At least fifty

applications are required in each group. The third group represents the holdout group and must contain an equal number of applications from both criterion groups (at least fifty total). This cluster of applications forms the basis for the validation of the instrument. Using the first two groups of applications the actual process of developing the tool can begin.

The success of any selection tool is dependent, in large part, on the effective development of that tool. According to England (1971), effective weighted applications are contingent upon a progression through the following seven major steps: (1) selection of a specific criterion of success, (2) formulation of criterion groups, (3) selection of application blank data to be analyzed, (4) specification of item response categories used in the analysis, (5) determination of item weights, (6) determination of cutting scores to be used in selection; and (7) application of those weights to a holdout group.

A thorough understanding of each of these is essential if an organization is to be successful in the development of an effective weighted application blank. An in-depth discussion of the points mentioned is provided in the following section.

Criterion of Success

A criterion, in this instance, is any variable that can be used as a surrogate for the prediction of success. Each criterion represents a distinct dependent variable used in the process. As such, these are the variables about which predictions are made using various independent variables. Organizations can use any of a number of factors, including tenure, supervisory ratings, and quantity and quality of production as dependent, or predictive, variables (Stone and Ruch 1974).

In determining which specific predictor is best for a given situation, Blum and Naylor (1968) identify fourteen elements that are important. Of special consideration among these, the criterion should be realistic, understandable, relevant, representative, reliable, predictive, measurable, free from bias, and discriminating (adapted from England 1971). Once these determinations are made, the applications are divided into two distinct groups, based on positive and negative levels of performance in the specified criterion.

In essence, the two groups of applications represent successful and non-successful employee performance within that criterion. For example, if tenure is the criterion of choice, the two groups would be comprised of long- and short-tenured employees. England (1971) refers to these as the high- and low-criterion groups, respectively. The next

step involves the identification of the independent variables (also referred to as biodata items). In this case, these are the items of importance contained in the application blank.

Analysis of Application Blank Data

Identification of independent variables is best accomplished through the use of correlation statistics. The purpose of this step is to isolate items which are indicative of an individual's propensity to fall into the high-criterion or low-criterion group. Because much of the data is nominal in nature, cross tabulations, used in conjunction with a chi square goodness of fit test, are currently the most widely applied statistical technique for this determination (Mitchell 1986).

To use this technique, all items on the employment application are coded as individual variables, with numeric classifications representing alternative responses. For example, one way to code educational achievement as an independent variable could be as follows:

1 = still attending high school,
2 = never completed high school,
3 = high school degree,
4 = trade school,
5 = high school degree and trade school
6 = some college,
7 = completed AA/undergraduate degree,
8 = some graduate work,
9 = completed master's degree,
10 = completed doctorate.

This process continues until all response options are coded for each independent variable. In must be noted that although this example is relatively straight forward, many items are much more difficult to code and may require careful identification of usable classifications. Most items normally contained on an application blank have been identified as valid predictors of success. Some items, however, may violate fair employment guidelines established by federal and state legislation (England 1971).

Using the procedure described above, the results are analyzed by assessing the frequencies of each variable classification respective of the group criterion (either successful or non-successful). The outcome of this procedure is an indication of the degree of association of the items as related (inversely) to the criterion of success (Bailey 1982). To determine the degree of association for each variable, the value of the chi-square statistic ($\underline{X}^2$) and the significance level ($\underline{p}$) of the relationship for each potential variable must be assessed. Once this process has been completed for each independent variable, item weights, which are a function of the importance of the variable, must be determined.

Generating Item Weights

England (1971) describes a simple process for assigning weights to items identified as significant in the previously

described process. This technique, called the horizontal percentage method, involves using the percentage differences between each codification, for each item, as a function of high-criterion and low-criterion groups. The difference between percentage response (with minus sign retained) is used to determine the net weight assigned the item. This is accomplished through the use of tables developed for this purpose (see England). Newer, and perhaps more reliable techniques include the use of discriminant and regression analysis to assign item weights (Smith, Smith, and George 1988). These procedures form the foundation of much of the methodology presented in Chapter III. When individuals are being classified into one group or another, and the number of groups is restricted and mutually exclusive, discriminant analysis is the method of choice (Norusis 1990). If the classification data are at least interval in nature, regression analysis is the more robust statistical procedure.

Cascio (1991, 351) describes the use of discriminant analysis as a "statistical procedure whose aim is to distinguish maximally between groups on the basis of multivariate information that is combined in a linear fashion." It is this linear combination of independent variables that is actually used to classify group

membership. The generic formula for the discriminant function is:

$$\underline{D} = \underline{B}_0 + \underline{B}_1X_1 + \underline{B}_2X_2 + \underline{B}_nX_n,$$

where $\underline{D}$ represents the discriminant score and $\underline{B}_0$ the y intercept or constant (Norusis 1990). The coefficients $\underline{B}_1$, $\underline{B}_2$, and so forth, are the independent variable weights, and the $\underline{X}$ values represent the independent variables.

Regression analysis, on the other hand, is used to predict the value of one or more dependent variables based on the linear combination of some independent variable(s) when the dependent variable is at least interval level. The standard equation associated with this procedure is:

$$\underline{Y} = \underline{B}_0 + \underline{B}_1X_1 + \underline{B}_2X_2 + \underline{B}_nX_n + e,$$

where $\underline{Y}$ is the dependent variable, and $\underline{B}_0$ and the $\underline{B}_nX_n$ combinations are as specified for the discriminant equation.

Depending on which technique is used, the concomitant values of $\underline{D}$ or $\underline{Y}$ are used to identify successful and non-successful employees. For the purposes of this study, both procedures were used with stepwise techniques, which identify and discard any independent variables which have little effect in the overall model. It must be noted that all items of significance are included as independent

variables--except those which might go against fair selection guidelines.

Application of the final prediction model is accomplished by assigning the values of each independent variable to the respective B coefficient and calculating the value of D or Y. The product is compared to some value determined to represent acceptable performance.

This value, identified as the cutoff, or critical score, is usually identified by subjective inspection of the scores represented by successful and non-successful employees during the validation of the weighted application blank (Potter 1983). The decision point is actually that score at which the distributions of successful and non-successful employees intersect (Siegel and Lane 1982). Once the cutoff score is established the weighted application can be validated.

Validation of Weighted Applications

As noted by Stone and Ruch (1974), validation studies must be carried out independently each time a new weighted application is developed. This is generally true regardless of whether the application is being developed for a business in an industry in which its use has already been validated or one in a new industry. As such, the technique has not been considered to possess a significant degree of external

validity--due, in part, to the situational specificity of the technique. An anomaly to this lack of generalizability is the use of weighted applications in the life insurance industry, where they have been used so extensively, that external validity within the industry has been established. The need for additional validation studies is generally not considered a problem, however, as validation of the weighted application blank on a case-by-case basis is relatively straight forward.

Initially, the process begins by testing the prediction model on the sample. This process alone is generally not considered sufficient (see, for example, Muchinski and Tuttle 1979, Reilly and Chao 1982). For an accurate assessment of the validity of the instrument, the use of a third group of applications, known as the holdout group, is necessary. The use of a holdout group is not technically sufficient to constitute a predictive criterion-related validity strategy. The only way to undertake such a process is through a longitudinal study. Nonetheless, the use of holdout groups is logical in weighted application studies.

The holdout group, as discussed earlier, is undifferentiated by criterion. That is, the applications are in random order with no regard to success or classification category. Scoring is accomplished using the weights found to differentiate between the two groups. Once

scored, the number of Type I and Type II errors can be identified. The number of these errors is indicative of the predictive ability of the tool. This process is, in essence, a modified form of a concurrent criterion-related validity study (Miner and Miner 1979). Simply stated, determination of validity is made through statistical analysis of the number of successfully identified individuals compared to those incorrectly identified. Miner and Miner report that simple correlations, chi-square, regression analysis, or a combination of these procedures is typically used for this assessment. To date, many studies have been conducted which assess the effectiveness of such validated instruments.

The Effectiveness of the Weighted Application

Use of weighted application blanks has been recognized as one of the best known techniques for differentiating between successful and non-successful employees (Caruth, Noe, and Mondy 1988). This contention is supported by Scollay (1957), in a study addressing the effectiveness of weighted applications as predictors of success in the workplace. In Scollay's study, three groups of employees, identified by supervisory personnel, were used. These groups were classified as successful employees, average employees, and failures. Two triserial correlations were

performed to assess the prediction validity of the weighted application blank with respect to the three groups. These correlations determined the significance of the tool's predictive ability related to the success criterion at the .01 and .05 level, both within the guidelines established later through the Uniform Guidelines (1979).

When studying the concurrent and predictive ability of these instruments, Buel (1964) concluded that intervening variables do not affect the statistical significance of either strategy. The major mitigating variables of question in his research evolved around the relocation of the general office twenty-five miles from its original site. It was feared that this occurrence would invalidate the weighting key and attract individuals who were different than expected. Further, a tight labor market was realized due to individual reluctance to travel to a suburban area (the new location of the office). Irrespective of these threats to the tool, concurrent validity was significant at the .01 level and predictive validity at the .02 level. Additional research has addressed the validity of this selection device in many different and diverse professions, including professional employees, unskilled workers, nurses, chemists, and individuals involved in state vocational rehabilitation programs.

In a study of the generalizability and cross-validity of biographical data in the assessment of creative research scientists, Buel, Albright, and Glennon (1966), found that the generality of the procedure may be of higher significance than previously believed. A weighting key developed for use with scientists in the petroleum industry was used to predict the success of their counterparts in the pharmaceutical industry. Fifty items were used in determining the level of creativity (the criterion of success) among the pharmaceutical employees. All validity coefficients were reported as significant at the .05 level or better. The strategy has also been validated for use with unskilled employees.

To predict the success of unskilled workers at a canning factory, Scott and Johnson (1967) used tenure as the criterion variable. Using the holdout group method, the technique correctly classified 72 percent of the population subgroup. This equates to a significance level greater than .01, with more than 80 percent of the variance explained by the weighted items. Unlike many studies dealing with validation of such instruments, the researchers used a random selection technique to reduce sample selection error. This was possible due to the large population from which the subjects were drawn, frequently a limitation in organizations.

Indeed, Myers and Errett (1959) identify inability to randomize as a major problem in weighted application studies. The problem is identified as preselection and typically occurs when a limited number of employees are available for a study's development. To control for this, Myers and Errett suggest the use of a multiple hurdles approach in the selection of individuals for inclusion in a study. They also suggest restricting the range of individual item validity coefficients and the development of preselection weights which serves as a two-stage screening process.

Another study which allowed the use of randomization, but was not as successful as Scott and Johnson's research, involved the prediction of success among individuals involved in vocational rehabilitation programs. This study, conducted by Ehrle (1964), utilized two experimental groups and one control group. Assessment of the 480 individuals comprising the three distinct groups indicated that no significant differences existed between the constituent population. This fact provides support for the effectiveness of the random selection process. While no significant findings were reported at the .01 level, the use of weighted applications predicted success an average of 16 percent over chance alone. In addition, when used to predict the propensity of hospital aides and orderlies to

remain with a hospital, McClelland and Rhodes (1969) found that the weighted application was a better predictor of success than the Minnesota Multiphasic Personality Inventory, a tool commonly used in the selection of hospital personnel.

Hughes, Dunn, and Baxter (1956) studied the validity of weighted application blanks in operational settings. The original weighted application used in their study was developed in 1951, and the predictive ability of the instrument was determined to be satisfactory at the onset. However, in measuring the effectiveness of the tool as used in 1952, 1953, and 1954, it was found that unacceptable prediction levels were realized in actual field use. Upon close analysis it was found that the managers who were using the tool were subjectively biasing the weights, rather than using the objective criteria established for use with the instrument. Any such occurrence, of course, negates the value of the prediction instrument.

This fact is exemplified by Ferguson (1951) in a study of the relationship of management quality and selection test validity. The findings of Ferguson's research revealed that there is a significant difference exists in the validity of the selection instrument based on the competence of the individual administering and scoring the technique. This finding is a strong indicator of the need to train and

maintain individuals who are competent in the administration of standardized procedures.

An organization's ability to maintain a competent workforce is essential to its survival. The information presented in this review provides support for this contention, and elucidates a strong link between the selection process and an organization's ability to achieve such a goal. The implication is that the strength of this link is inextricably tied to the selection strategies and techniques used. The related premise of this research is that the use of weighted application blanks provides an effective link with the maintenance a competent workforce in the nursing home industry.

Summary

Effective selection of employees plays a major role in the degree of success or failure experienced by companies. This fact is evidenced by the voluminous number of writings and studies addressing the subject. Such efforts have focused on the legal, as well as technical facets of the selection process, and have done much to promote contemporary understanding of the important role the selection process contributes toward organizational effectiveness.

Government regulation and changing demographic patterns in the workforce have greatly complicated organizational efforts in this regard. Not only must employers choose from a plethora of selection techniques, each tool used must be able to withstand the scrutiny of the courts if disparate impact is suspected. To accomplish this, complex validation strategies have been developed to ensure that procedures are accurately predicting specific facets of job performance. Such endeavors have identified many strengths and weaknesses in the various selection strategies, as well as the direct and indirect consequences when companies fail to utilize valid approaches in the selection of employees.

These strategies, which range from simply collecting applicant information to the complex task of measuring psychological constructs, are all used to varying degrees in an effort to promote the best possible fit between organizations and the individuals secured for employment. Depending on the industry, type of organization, and the job classification, different procedures have been shown to have a greater or lesser degree of success in each situation.

One such technique, the weighted application blank, is commonly used by organizations to differentiate between applicants who have a propensity for success, and those who are not likely to succeed. Weighted applications have been successfully used to predict a number of different job

related criteria, including sales volume and career potential. Research evidence supports the validity of the procedure, and advances in the methods used have not only promoted the efficacy of the process, but the convenience of using it in the selection process as well.

CHAPTER III

METHODOLOGY

Introduction

Emery and Cooper (1991) identify the need to describe the procedures used in a research project as one of the essential tenets of the scientific method. The implications of this need are important, as many benefits, ranging from enhanced access to review by other scientists, to complete replicability of the study, are realized through clear documentation of the methods and procedures used. This section provides such a framework, and is founded upon the aforementioned hypotheses. The first hypothesis predicted that:

H1: Weighted application blanks will identify a higher percentage of individuals who will remain with the organization than does the current experience; and the second predicted that,

H2: By scaling the data and using Mann-Whitney U to screen significant items for ordinal, interval, and ratio data in conjunction with the chi-square test of independence (for nominal data), followed by stepwise regression to develop item weights and the final prediction model, the

percentage of individuals correctly classified by the experimental weighted application blank will be greater than those classified using the currently accepted weighted application blank strategy. Based on these hypotheses, the methods and procedures used to guide this research were developed.

The methodology for the study is presented in three parts: demographics, the validation stage, and the methodological stage. The first part identifies the taxonomy, target, and sample population information. The second part outlines the validation techniques used in conducting the base analysis of this study, using chi-square test of independence and discriminant analysis. The third part describes the strategy and techniques used in the methodologic development stage of the research. Included in this section are details of the development and testing of the weighted application using Mann-Whitney U for ordinal and intervally coded data, in conjunction with chi-square and discriminant analysis, as previously described.

Demographics

The overall taxonomy of this study is statistical-archival in nature. That is, the information used for the analysis was originally collected for purposes other than those intended in this study, and the research is

statistically based (Buckley, Buckley, and Chiang 1976). A distinct advantage of this strategy is that the research technique is completely unobtrusive. There was no interaction with the employees. In fact, the employees themselves were not involved in the research, only the application sheets they completed during their search for employment were utilized as sources of data.

Target Population

The population for this study was a nursing home chain within the four-state region of Iowa, Kansas, Missouri, and Nebraska. While using a large organization of this nature makes data collection more difficult, there are several benefits which outweigh the added burden. First, smaller, single-facility operations impinge on the ability to randomly select and assign subject information. This is a significant concern, as random assignment is the foundation for controlling the problems of preselection identified by Myers and Errett (1959).

The second benefit is that an organization of this size allows for the use of multiple sites in the study. By using multiple locations, and engaging in a follow-up, longitudinal study, information concerning the generalizability of the weighted application can be obtained. The notion of generalizability, or external

validity, is an area that has not received much attention, but may prove invaluable to practitioners.

Sample

The data for this study were collected directly from the administrators of each facility. Each administrator received instructions from the corporate president to randomly select and provide a minimum of twenty applications (ten each) of individuals who remained with the facility at least six months (long-tenured) and those who were employed three months or less (short-tenured).

The long-tenured and short-tenured classification strategy was established after conversations with the corporation's president, during which it was indicated that (1) the break-even point for hiring a new employee is three months; (2) while facilities do not lose money on individuals who separate after four to five months, these employees lack the long-term commitment necessary to develop a productive relationship; and (3) six months is considered the critical period, after which new employees are more likely to remain with the company and develop commitment to the company and the residents.

An initial sample of 288 applications was collected, with 142 from long-tenured employees and 146 from short-tenured employees. The applications were screened for

conformance to the demographic characteristics of the target group. Two criteria were employed in this process. Applications were considered inappropriate if the position applied for and obtained was not related to first-level primary care, or if an application was vastly different in the type or quantity of information it contained.

After screening, twenty-seven long-tenured and twenty-three short-tenured employee applications were excluded from further analysis. Of the remaining 238 applications, thirty-one long-tenured and thirty-one short-tenured were selected using simple random sampling techniques (see the random number table, Appendix B, Nachmias and Nachmias 1981) for use as the holdout group. This served as the test group once the weighted application was developed. The final set of applications for use in the development of the weighted application blank was comprised of eighty-four applications from long-tenured employees and ninety-two from short-tenured employees. Figure 1 provides a breakdown of the sample demographics.

The next step in the process involved the coding of the application data. As identified in the results section and through the information provided in Appendix B, each variable was classified using the information provided by the past and current incumbents.

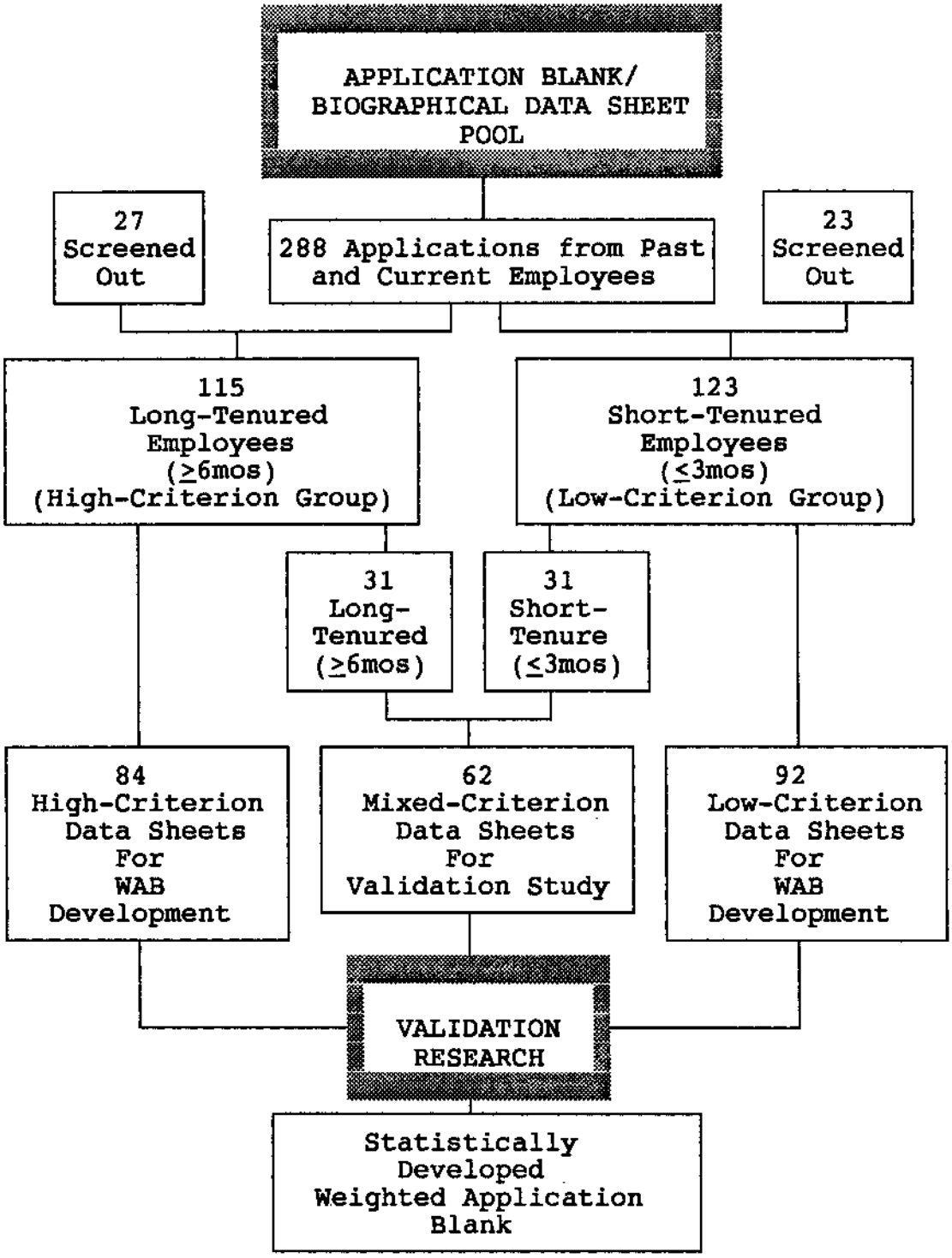


Figure 1. Sample demographics

Validation Stage

The validation stage of the research design pertained to the initial validation of the weighted application blank system in the participant nursing home corporation. England's (1971) approach was used as the foundation, but was modified with chi-square test of independence and discriminant analysis as the statistical procedures for developing the weighted application, rather than judgment and the horizontal percentage method described earlier.

Validation Techniques

The general strategy of the study followed that outlined in this text and described by England (1971). Cross-tabulations and the chi-square test of independence was employed to identify significant items. Of the two strategies identified for item and weight determination, discriminant analysis was chosen as the appropriate procedure because the classification strategy for tenure is dichotomous (This classification strategy was introduced to me by the president of a consulting firm with experience in developing weighted applications for predicting tenure in the retail industry. Whether this is the most appropriate measurement level (nominal) is addressed in the discussion concerning the outcome of Hypothesis 2). Using discriminant analysis for weighting determination has many advantages,

but is also more complicated than the horizontal percentage method (Smith, Smith, and George 1988).

The first step in the process involves the identification of significant biodata items using cross-tabulations and the chi-square test of independence. This is done to reduce the aggregate data to only those variables considered relevant for further analysis. In addition, through this procedure, logical transformations can be made to improve the classification of response codes and aid in the development of the prediction equation.

The remaining variables were then analyzed using discriminant analysis. For the purpose of this research, the stepwise method was used with PIN and POUT set at .1 and .15, respectively. PIN is the probability level of F necessary to include the variable in the equation, while POUT is the probability level set for variable removal (SPSS 1986). This removed any remaining extraneous or redundant variables from the prediction equation. The results from this analysis were also used as the basis for the development of the cutoff score.

All statistical computations were carried out using the PC+ version of Statistical Package for the Social Sciences (SPSSPC+ version 4.0). Prior to testing the first hypothesis using the holdout group, data from the initial sample was used to determine if, indeed, any statistical

support for the model exists. This was followed by the hypothesis test utilizing the data from the holdout group.

Methods for Methodological Study

The purpose of this portion of the research was to assess the implications of purposefully scaling the data in such a manner as to allow the application of stronger statistical procedures to the data. Because no evidence beyond the work of Smith, Smith, and George (1988) of such testing exists, it was considered possible that a more rigorous procedure could improve the predictive validity of the weighted application process.

The nonparametric test, Mann-Whitney U, was selected for use in reducing the number of independent variables to be included into the final regression procedure. This test was selected because of certain inherent characteristics. These characteristics and their relationship to the purpose of this study are discussed in the following section.

Mann-Whitney U

The Mann-Whitney U test was chosen as the statistical procedure of choice for this research for several reasons. First, it requires at least ordinal level data and is an association of rank order values. This not only provides information on the importance of the directional trend of each item, but also indicates the importance of the relative

weight of that direction. Second, as described by Siegel (1956), the Mann-Whitney U is considered one of the most powerful nonparametric tests available. Third, the requirement of independent samples is consistent with the nature of the sample populations included in this study.

Statistical Application

In developing the weighted application for this portion of the study, specific items, such as "length of employment at last job" and "average length of employment at all jobs listed," were coded using ordinal, interval, and ratio scales, as appropriate, to support the use of Mann Whitney U in identifying the items of significance. Nominal coding was used when this was not possible and a standard chi-square procedure was used for analysis.

Instead of using tenure as a dichotomous grouping variable, the employee's actual length of service (number of weeks) was used. Item weights and cutoff scores for this stage of the research were developed using stepwise regression, as the dependent variable was comprised of interval-ratio level data.

Methodologic Validation

Determination of the efficacy of developing the weighted application using the two methods for developing item weights proceeded using the McNemar test. This method

was selected as appropriate for assessing whether the percentage of individuals correctly and incorrectly classified was significantly different between groups because of its statistical power, the size of the sample, and the nature of the data.

Summary

This research was completed in two stages using data collected from a large, midwest nursing home chain. The first stage involved the development of a weighted application blank using procedures currently practiced by industry. The second stage modelled the parameters of the first, except that an alternate method was employed for determining which independent variables were significant, and for measuring their contribution to the final model. Through this, the alternate strategy was tested in an effort to determine if methodologic improvements could promote the validity of the weighted application blank.

The results of the tests carried out through these stages are presented in the following chapter. An intensive discourse is presented over the first stage, because of the complicated process involved in developing nominal coding, and the analysis of the chi-square output. A discussion of the results of the modified approach is followed by the outcome of the test of the two models.

CHAPTER IV

RESULTS

Introduction

The results of this study reveal interesting information respective of both the initial validation and the experimental Mann-Whitney U approach. A detailed presentation of these results are reported in three major sections. The first section includes information from the development and testing of the weighted application blank using the chi-square method in conjunction with discriminant analysis. The second section describes the same process using the Mann-Whitney U in conjunction with regression analysis. The third section includes the results of the final stage of this research--a comparison of the two methods to determine if a significant difference exists in the predictive validity of the two methods.

The Weighted Application-- Chi-Square Development

The first step in the development of the weighted application proved very encouraging from at least two perspectives. First, fourteen items were identified as being highly significant differentiating variables. After

further analysis using discriminant analysis, seven of these items were included in the final model. Second, information revealed during the development and analysis of this section may prove beneficial to the furtherance of additional research related to employee behavior in nursing homes.

Item Significance--Chi-Square Test of Independence

The results presented in this section concern the identification of application blank items determined to be significant in the prediction of tenure. Using the applications provided, fifty-one items were identified, coded, and analyzed using cross-tabulations and chi-square test of independence (a copy of the application currently used by the corporation is provided in Appendix A). Table 1 includes a list of the variable labels for each item used in the analysis and a brief description of each. A complete account of variables is provided in Appendix B: Coding Instructions--Chi-Square, 1^{ST} Run.

Assessment of the first run output led to the exclusion of twenty-six variables from further consideration. These variables were excluded for the following reasons:

1. large numbers of applications did not include the item as an option (Several of the facilities use application forms which are somewhat different in the context of

TABLE 1

VARIABLE LABEL AND DESCRIPTION:
CHI-SQUARE ANALYSIS

Variable	Description
APPCODE	Application blank code number
NHCODE	Nursing home code
POSAPP	Position applied for
APPDATE	Date of application
REFSORCE	Source of referral
NAME	Applicant name
STREET	Street identified
CITY	City identified
STATE	State identified
ZIP	Zip included
TELEPHON	Home phone
SSN	Social security number
AGE	Provide proof of age
EMPBEFR	Previously employed with Quality Care
CUREMP	Currently employed
CONTPRES	Contact present employer
DATEWORK	Date can start work
FULLTIME	Work status
FELONY	Convicted of abuse
EDUC	Highest grade completed
SCHNAME	School identification
CORSTUD	Courses studied
DIPLOMA	Diploma listed
TRAINING	Specialized training
HONORS	Honors received
ADDINFO	Additional information for consideration
MEMBRSHP	Membership in professional organization
REFNAME	Reference names provided
REFADD	Reference address provided
REFTEL	Reference telephone provided
TRANMIL	Train in military
DISABL	Any impedance to job
WORKEXP	Previous work experience
LOS	Length of service indicated
NUMEMP	Number of understandable employer names
NUMADD	Number of complete employer addresses
NUMEPHON	Number of complete employer phone numbers
WAGEINCR	Wage increase last job
NUMINCR	Number of jobs realizing wage increase
NUMWAGE	Number of wage rates listed
NUMWPER	Number of complete work performed sections
NUMREL	Number of related work experiences

Table 1--Continued

Variable	Description
NUMJTIT	Number of complete job titles
NUMSNAM	Number of complete supervisor names
RSNLAST	Reason for leaving last job
NUMRSN	Number of complete reasons for leaving
SKILLS	Special skills and qualifications
LOSLJOB	Length of service last job
LOSAVG	Average length of service--all jobs
APPSIGN	Signed application
DATESIGN	Dated signing
EMERGEN	Emergency contact
EMPREF	Use past employer as reference
WRKRPT	Completeness of work history

information requested; consequently, some of the variables were excluded because too many applications did not contain them as options.),

2. there was no pattern (spurious association) or logical reclassification strategy for the item, and

3. the p-value was significantly large so as to negate the possibility of any relationship between the item and tenure.

For example, the variable felony (representing the application item: Have you ever been convicted of client/child abuse) identified in Figure 2 was excluded because fifty-seven of the applications did not prompt applicants for information regarding such felony convictions. Where the cell categories are represented as 1 = left blank; 2 = yes, no explanation; 3 = yes, explanation; 4 = no; and 5 = wrote N/A.

	FELONY Cell Category 1	3	4	5	ROW TOTALS
SHORT-TENURED	0	2	79	0	81
LONG-TENURED	2	0	36	1	39
COLUMN TOTALS	2	2	115	1	120

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.<5
7.26867	3	.0638	.325	6 OF 8 (75%)

Figure 2. Crosstabulations: Tenure by convicted of felony

While significant at the p = .06 level, any inference is clearly spurious, as few differences exist in responses between the two groups (classification, crosstabulation, and chi-square statistics for independent variables not specifically addressed in the text are presented in Appendix B). Additionally, a large number of cells contain fewer than five observations. As described by Emory and Cooper (1991), expected cell frequencies below five cannot constitute more than 20 percent of the cells. Siegel (1956), advocates combining logically related cell categories to overcome such problems. The reason this becomes a problem is clarified in the next example.

The relationship among response options for POSAPP (position applied for) is identified in Figure 3. In this instance, the cell categories are represented as: 1 = left

	POSAPP Cell Category 1	2	3	4	5	6	7	8	9	10	ROW TOTALS
SHORT-TENURED	1	41	17	21	4	2	2	1	2	1	92
LONG-TENURED	7	31	15	13	2	2	2	0	11	1	84
COLUMN TOTALS	8	72	32	34	6	4	3	1	13	2	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
16.79808	10	.0790	.477	14 OF 22 (63.6%)

Figure 3. Crosstabulations: Tenure by position applied for

blank, 2 = nursing aide, 3 = dietary aide/kitchen, 4 = certified nurse aid, 5 = certified dietary aid, 6 = activities aide, 7 = medical aide, 8 = orderly, 9 = housekeeping, and 10 = any position available.

Once again, a marginal relationship is evident, but no logical pattern can be identified. Inability to logically collapse cells impedes the process by violating the minimum cell frequency requirement for chi-square analysis. In this, as well as the previous, case a large number of cells have insufficient frequencies. As noted in Figure 3, fourteen of twenty-two cells (63.6 percent) contain fewer than five observations--the minimum cell frequency necessary to maintain the statistical power of the procedure (1-β; where β represents the level of Type II error).

While some of the cell categories are related, a review of the crosstabulation presented in Figure 3 illustrates the difficulty in combining cells. Note that in cell classifications 1, 6, 7, 9, and 10 there appears to be no justifiable argument for combining these with any other cell categories. Consequently, eight of fourteen cells would still be left with fewer than five observations. This, and the aforementioned factors, were all given careful consideration in assessing the remaining relevant variables. A complete list of the variables screened at this stage, along with the reason(s) for exclusion are identified in Table 2.

Due to their respective p values, the variables WORKEXP (previous work experience) and APPSIGN (signed application) provide good examples of some of the problems that can be encountered in developing a weighted application. When considering the crosstabulation between APPSIGN and tenure (Figure 4) it becomes evident the only major difference between groups lies in the fact that ten long-tenured employees did not sign the application (cell category 1), while only one short-tenured employee failed to do so (cell category 2).

While this may be statistically significant, it would be unreasonable to conclude, based on only 12 percent of the long-tenured employees' failure to sign the application,

TABLE 2

VARIABLES EXCLUDED FROM ANALYSIS
AFTER FIRST RUN CHI-SQUARE

Variable	Reason Excluded*
POSAPP	p = .07/no apparent pattern
APPDATE	p = .06/no apparent pattern
NAME	p = .87
STREET	p = .18/no apparent pattern
CITY	p = .52
STATE	p = .06/no apparent pattern
ZIP	p = .63
SSN	p = .43
EMPBEFR	p = .63
FELONY	p = .06/not option--56 applications
SCHNAME	p = .74
TRAINING	p = .10/no apparent pattern
HONORS	p = .09/not option--78 applications
ADDINFO	p = .01/not option--70 applications
MMBRSHP	p = .02/not option--76 applications
REFNAME	p = .22/no apparent pattern
TRAINMIL	p = .60/not option--63 applications
DISABLE	p = .18/no apparent pattern
WORKEXP	p = .00/no apparent pattern
NUMEPHON	p = .08/not option--47 applications
RSNLAST	p = .62
SKILLS	p = .94
APPSIGN	p = .01/no apparent pattern
DATESIGN	p = .06/not option--59 applications
EMERGEN	p = .83/not option--130 applications
EMPREF	p = .23/not option--79 applications

*Yates correction applied for 2 x 2 tables

that the variable APPSIGN would be useful in predicting tenure. Concerning the variable WORKEXP, a different but equally dubious situation exists.

As noted in Figure 5, a flip-flop pattern exists between response categories 3, 4, 5, and 6. These categories represent the applicant's indication of having

	APPSGN Cell Category 1	2	ROW TOTALS
SHORT-TENURED	1	75	76
LONG-TENURED	10	73	83
COLUMN TOTALS	11	148	159

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
5.52748	1	.0187	5.258	NONE

Figure 4. Crosstabulations: Tenure by signed application

	WORKEXP Cell Category 1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	3	2	14	27	13	32	1	92
LONG-TENURED	12	1	19	15	22	14	1	84
COLUMN TOTALS	15	3	33	42	35	46	2	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
18.95277	6	.0042	.955	4 OF 14 (28.6)

Figure 5. Crosstabulations: Tenure by previous work experience listed

one, two, three, or four previous jobs, respectively. The existing pattern cannot support the use of previous work experience in a prediction equation, because no consistency or trend was found between long- and short-tenured

individuals. Failure to adequately scrutinize these relative associations can cause one to include variables that pose serious validity threats to the resulting model. It must be stressed that the determination of which variables to include at this stage requires the ability to justify the association between cells.

Items included for further analysis were retained based on three factors: (1) the significance level, (2) chi-square values, and (3) the potential value of variable reclassification. Based on these criteria, twenty-six variables, identified in Table 3, were subsequently retained.

Eleven of these variables, REFSORCE, FULLTIME, CORSTUD, DIPLOMA, NUMADD, WAGEINCR, NUMWAGE, NUMSNAM, LOSLJOB, LOSAVG, and WRKRPT were significant at the $p < .01$ level, while four others, CONTPRES, DATEWORK, NUMEMP, AND NUMJTIT were between the $p < .01$ and $p < .05$ significance levels. While the significance level for some of these variables (specifically: EDUC, REFADD, REFTEL, AND NUMWKPER) were not considered statistically significant, a pattern in the cell categories warranted further consideration to promote the efficacy of the classification strategy.

For example, the original chi-square analysis for the variable EDUC is identified in Figure 6. The respective cell category descriptions are 0 = left blank, 1 = no high

TABLE 3

VARIABLES INCLUDED IN ANALYSIS
AFTER FIRST CHI-SQUARE RUN

Variable	Level of Significance	Chi-Square Value*
REFSORCE	p = .0009	24.38224
TELEPHON	p = .1532	5.26849
AGE	p = .0808	5.32830
CUREMP	p = .0829	4.98115
CONTPRES	p = .0205	9.78511
DATEWORK	p = .0760	14.22932
FULLTIME	p = .0068	16.03047
EDUC	p = .3435	10.08661
CORSTUD	p = .0005	17.70440
DIPLOMA	p = .0043	10.89460
REFADD	p = .2203	8.25102
REFTEL	p = .5220	6.15302
LOS	p = .1841	11.32137
NUMEMP	p = .0317	13.82168
NUMADD	p = .0000	33.36485
WAGEINCR	p = .0101	18.25833
NUMINCR	p = .0940	14.88962
NUMWAGE	p = .0003	26.89546
NUMWKPER	p = .3214	6.99368
NUMREL	p = .0910	14.99913
NUMJTIT	p = .0380	14.85901
NUMSNAM	p = .0092	20.31490
NUMRSN	p = .1301	11.19975
LOSLJOB	p = .0022	18.69030
LOSAVG	p = .0006	29.19683
WRKRPT	p = .0006	11.77651

*Yates correction applied for 2 x 2 tables

school degree, 2 = high school or GED, 3 = trade school only, 4 = trade school and high school degree, 5 = some college, 6 = two-year degree, 7 = four-year degree, 8 = some graduate work, and 9 = graduate degree.

	EDUC Cell Category 0	1	2	3	4	5	6	7	8	9	ROW TOTALS
SHORT-TENURED	1	17	39	2	5	20	1	4	2	1	92
LONG-TENURED	2	21	31	1	3	17	5	0	1	0	81
COLUMN TOTALS	3	38	70	3	8	37	6	4	3	1	173

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
10.08661	9	.3435	.468	12 OF 20 (60%)

Figure 6. Crosstabulations: Tenure by level of education

An apparent dispersion across the cell categories with 60 percent of the cells having an expected frequency of less than five provides little useful information. However, long-tenured and short-tenured employees appear to differ, especially with regard to classifications 1 and 2, no high school degree and high school degree or GED, respectively. Cell categories were therefore combined, as detailed in Table 4, to increase cell frequencies and improve the strength of the variable sub-classifications.

Using the same approach, all variables retained for further analysis were reclassified, where appropriate, and again analyzed using crosstabulations and chi-square test of independence (classification, crosstabulation, and chi-square statistics for reclassified independent variables not

TABLE 4

VARIABLE SUB-CLASSIFICATION FOR EDUC BEFORE AND AFTER FIRST CHI-SQUARE RUN

Initial Cell Categories First Chi-Square Run	Cell Categories Combined After First Chi-Square Run
0 = left blank	0 = left blank
1 = no high school degree	1 = no high school degree
2 = high school degree/GED	2 = high school degree/GED
3 = trade school only	1 = trade school only
4 = trade school and high school degree	2 = trade school and high school degree
5 = some college	5 = some college
6 = two year degree	5 = two year degree
7 = four year degree	5 = four year degree
8 = some graduate work	5 = some graduate work
9 = graduate degree	5 = graduate degree

specifically addressed in this text are presented in Appendix C.

For this stage of the analysis, variables were excluded primarily on the basis of the significance level of the chi-square test, although some variables were excluded because the relationship appeared spurious. The maximum significance level for inclusion into the final run was set at $p \leq .05$, which, for this stage in the development of the model, is stringent. Upon analysis, twelve variables were excluded from further consideration (see Table 5).

In all, fourteen variables were retained. These variables, identified in Table 6, along with their

TABLE 5

VARIABLES EXCLUDED FROM ANALYSIS
AFTER SECOND CHI-SQUARE RUN

Variable	Significance*
PHONE	$p = .45$
AGE	$p = .12$
DATEWORK	$p = .09$
FULLTIME	$p = .47$
EDUC	$p = .65$
REFADD	$p = .08$
REFTEL	$p = .17$
WAGEINCR	$p = .28$
NUMINCR	$p = .09$
NUMWKPER	$p = .09$
NUMREL	$p = .09$
NUMSNAM	$p = .17$

*Yates correction used for all 2 x 2 tables

TABLE 6

VARIABLES INCLUDED IN ANALYSIS
AFTER SECOND CHI-SQUARE RUN

Variable	Level of Significance	Chi-Square Value*
REFSORCE	$p = .0015$	19.64446
CUREMP	$p = .0001$	20.78617
CONTPRES	$p = .0205$	9.78511
CORSTUD	$p = .0001$	17.62044
DIPLOMA	$p = .0043$	10.89460
LOS	$p = .0162$	5.78180
NUMEMP	$p = .0059$	7.59428
NUMADD	$p = .0000$	19.22586
NUMWAGE	$p = .0004$	12.64090
NUMJTIT	$p = .0079$	7.06104
NUMRSN	$p = .0370$	4.34832
LOSLJOB	$p = .0008$	14.28811
LOSAVG	$p = .0030$	11.62969
WRKRPT	$p = .0006$	11.77651

*Yates correction used for all 2 x 2 tables

respective p values, were then analyzed using the discriminant procedure.

Specifically, the stepwise procedure was used to identify the most important of the remaining variables and develop the item weights and final prediction equation.

Item Weights

Of the 178 coded applications retained for use in the development of the model (ninety-two short-tenured and eighty-four long-tenured), the discriminant process excluded eighty-seven due to missing values for the discriminating variables. Retained for the discriminant process were thirty-two long-tenured applications and fifty-five short-tenured applications. This represents a functional loss of almost 62 percent of the long-tenured population, while only 40 percent of the short-tenured applications were eliminated due to missing values.

Analysis of the remaining applications was completed using the stepwise discriminant procedure, with Wilks' Lambda used as the selection method, and PIN and POUT set at .1 and .15 respectively. Wilks' Lambda, the ratio of the within groups sum of squares to the total sum of squares, provides information relevant to two facets of the model (Norusis 1990). First, individual values can be used to identify the degree to which group means differ--the smaller the value, the greater the difference between group means.

Wilks' Lambda and the significance level for each of the remaining seven variables are delineated in Table 7. Of the

TABLE 7

VARIABLES ENTERED IN
DISCRIMINANT MODEL

Variable	Wilks' Lambda	Significance
REFSORCE	.88297	.0012
CORSTUD	.78474	.0000
CONTPRES	.71011	.0000
NUMADD	.66158	.0000
LOSAVG	.61619	.0000
NUMWAGE	.59360	.0000
NUMRSN	.56657	.0000

significant variables remaining, the variable source of referral (REFSORCE) exhibits the smallest difference between group means, while the difference in group means for number of complete reasons for leaving (NUMRSN) appears to be the greatest.

The second piece of information using Wilks' Lambda pertains to the degree of association between group means for the discriminant function. The group means for short-tenured and long-tenured employees, also referred to as the group centroids, are -.65943 and 1.13340, respectively, with a corresponding Wilks' Lambda of .5666 (p = .0000, DF =

7,79). This indicates that a significant difference between the two groups is apparent.

The final prediction model was developed using two equations produced through Fisher's Linear Discriminant Function Coefficients, part of the output of the discriminant procedure in SPSSXPC+. These coefficients, delineated for short- and long-tenured employees are presented in Table 8.

TABLE 8

DISCRIMINANT CLASSIFICATION FUNCTION COEFFICIENTS
(FISHER'S LINEAR DISCRIMINANT FUNCTION)

Variable	Short-Tenured	Long-Tenured
REFSORCE	5.253147	6.892688
CONTPRES	6.077226	7.328353
CORSTUD	4.225131	5.280259
NUMADD	4.767205	6.545433
LOSAVG	6.650650	7.526787
NUMWAGE	4.327805	6.195803
NUMRSN	8.899680	6.856417
Constant	-33.105330	-45.862940

Using these data, the two equations developed from the variable coefficients take the form:

Group 1 = -33.10533 + 5.253147*REFSORCE + 6.077626*CONTPRES
+ 4.225131*CORSTUD + 4.767205*NUMADD + 4.327805*NUMWAGE
+ 8.899680*NUMRSN + 6.650650*LOSAVG; and

Group 2 = -45.86294 + 6.892688*REFSORCE + 7.328353*CONTPRES
+ 5.280259*CORSTUD + 6.545433*NUMADD + 6.195803*NUMWAGE
+ 6.856417*NUMRSN + 7.526787*LOSAVG;

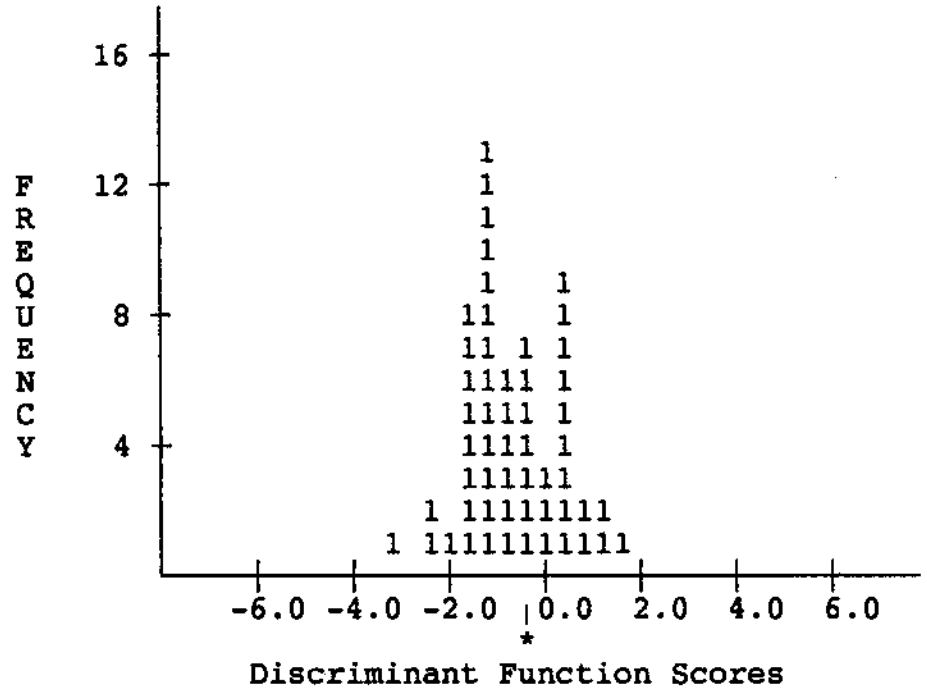
where Group 1 represents the classification score for short-tenured employee applications and Group 2 the classification score for long-tenured applications. Group classification, as described in the SPSSX User's Guide (SPSS 1986), is determined by the magnitude of each of these calculations. The equation producing the larger value identifies the case observation's predicted group membership.

Criterion-Related Validity--Chi-Square Weighted Application

The model was first tested on the original data using the classification function option in SPSSPC+. Through this, the program automatically classifies the data into predicted group membership. This yielded a correct classification rate of 78 percent, with only eight Type I errors and eleven Type II errors, as identified in Figure 7. As developed, the model appears to possess a reasonable degree of accuracy concerning the prediction of tenure, with 80 percent of the short-tenured and 75 percent of the long-tenured applications correctly classified. Figures 8 and 9 present these data in histogram form, using the discriminant function scores for short-tenured and long-tenured employees, respectively. The group means, or centroids, discussed earlier, are identified in each figure.

		Actual: Short-Tenure	Actual: Long-Tenure
Predicted	Short-Tenure	44 (80.0%)	8 (25.0%) TI errors
Predicted	Long-Tenure	TII errors 11 (20.0%)	24 (75.0%)

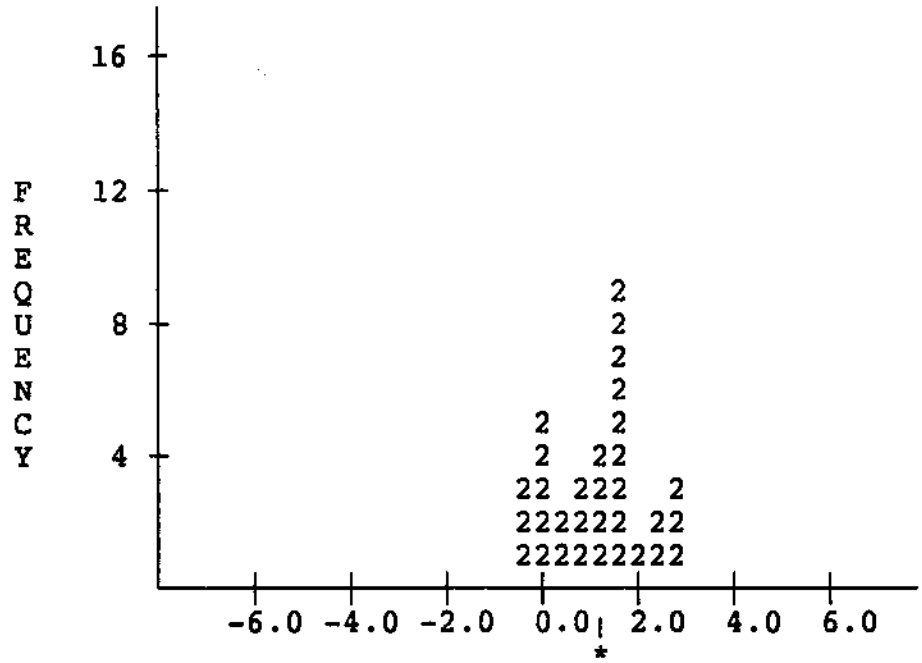
Figure 7. Predicted versus actual tenure classification initial test



* = Score for Group 1 centroid (-.65943)

Figure 8. Discriminant function histogram for Group 1--short-tenured employees

The discriminant function scores of short-tenured employees (Figure 8) range from -3.29 to 1.62, with a

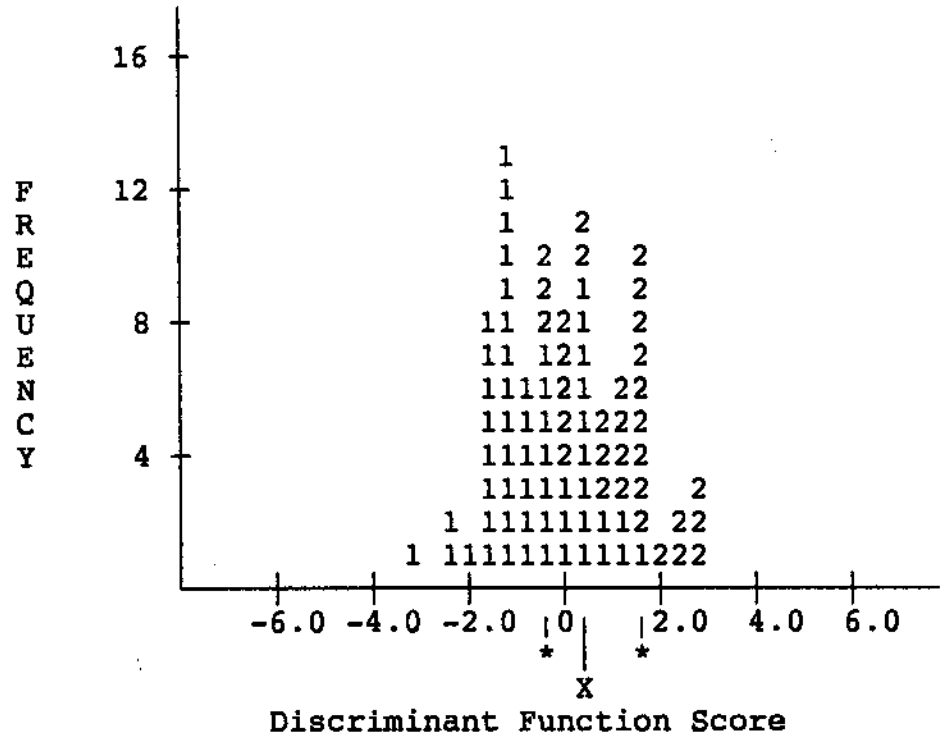


* - Score for Group 2 centroid (1.13340)

Figure 9. Discriminant function histogram for Group 2--long-tenured employees

slightly leptokurtic distribution (ku = +.01), and a mild positive skew (+.09). The long-tenured group, identified in Figure 9, has a range from -.44 to 2.90, with a platykurtic (-.85), positively skewed (+.17) distribution of scores.

The fact that the long-tenured group has a moderate positive skew may indicate a problem when using the model. Those long-tenured individuals weighting the left tail of the distribution are clustered around and below the mean of the two group centroids (X), as evident when viewing Figure 10, the canonical discriminant function scores for both groups in the form of a stacked histogram (In this case, X =



* - Respective Group Centroids
X - Mean of Group Centroid Scores

Figure 10. Canonical discriminant function stacked histogram short-tenured (1) and long-tenured (2)

.23698 and is used to identify group membership in the final model).

The potential implications of this clustering are discussed later in this chapter. At this stage in this study, these data were used to determine the merits of the model prior to hypothesis testing.

Since the final sample for the discriminant process included 63 percent of the applications of short-tenured employees, the rate of Type II error is fixed at that level (use of this figure as the level of type II error is

described by Norusis 1990). Only eleven of the short-tenured employees were incorrectly classified as long-tenured, yielding a Type II error rate of 20 percent. Considering the model from this perspective, over 40 percent fewer Type II errors occur when using the model.

In an effort to promote the efficacy of the model and eliminate applications falling into the grey zone apparent in the histogram (Figure 10), a 10 percent buffer was incorporated into the model. For this stage it was found that a new model using the standardized canonical discriminant function coefficients, along with the mean of the group centroids (discussed earlier) was easier to work with than the earlier two equation model using Fisher's linear discriminant function (originally recommended in the SPSSX User's Guide 1986). The model of choice is represented by the equation:

Tenure = -6.878886 + .91449468*REFSORCE + .6978474*CONTPRES
+ .5885238*CORSTUD + .9918507*NUMADD + 1.041922*NUMWAGE
- 1.139681*NUMRSN + .4886874*LOSAVG.

Tenure is predicted by classifying each application with the previous model, using the following decision rule:

If Tenure $\leq$ .9*.23698, classify as short-tenured;

If Tenure $\geq$ 1.1*.23698, classify as long-tenured.

The outcome of this rule was then compared to the known tenure classification values using crosstabulations.

The prediction of employee tenure was improved to 87 percent of the cases being correctly classified. The resulting levels of Type I and Type II errors are 17.2 percent and 10.9 percent, respectively. Again a higher proportion of long-tenured applications was misclassified. Figure 11 identifies the breakdown of this section of the analysis.

		Actual: Short-Tenure	Actual: Long-Tenure
Predicted	Short-Tenure	44 (89.1%)	5 (17.2%)
Predicted	Long-Tenure	5 (10.9%)	24 (82.8%)

Figure 11. Predicted versus actual tenure classification discriminant model using original data--initial test with 10 percent buffer

Hypothesis 1 was then tested on the model developed with the buffer using a second series of applications collected to represent England's (1971) holdout group. This group was comprised of sixty-two applications, thirty-one from each group--short-tenured and long-tenured. Figure 12 represents the outcome of this final application of the model.

		Actual: Short-Tenure	Actual: Long-Tenure
Predicted	Short-Tenure	28 (90.4%)	22 (88.0%)
Predicted	Long-Tenure	3 (9.6%)	3 (12.0%)

Figure 12. Predicted versus actual tenure classification discriminant model using holdout data

The binomial test (Siegel 1956) was used to determine whether to reject or fail to reject the null hypothesis:

$$H_0: \hat{P}_1 = \hat{P}_2,$$

where $\hat{P}_1$ is the total proportion of the sample correctly classified using the weighted application blank (55 percent) and $\hat{P}_2$ is the total proportion correctly classified by the nursing home personnel (37 percent). Based on the outcome of this test, and the data presented in Figure 12, the null hypothesis was rejected in favor of the alternate hypothesis ($H_a: \hat{P}_1 > \hat{P}_2$). That is, the predictive accuracy of the weighted application blank is significantly better than the organization's current selection experience ($\underline{Z} = 2.75$, $\underline{p} < .05$).

In this instance the weighted application appears to be extremely "robust" in committing Type I errors. The model appears to effectively identify short-tenured employees (twenty-eight, or 90.4 percent, were correctly classified) but only three (12 percent) of the applications from long-tenured employees were correctly classified--representing a Type I error rate of 88 percent. A potentially important reiteration of a problem noted earlier is that while none of the thirty-one short-tenured applications were eliminated from analysis, almost 20 percent of the long-tenured applications were excluded because they contained missing information for one or more discriminating (independent) variables.

The Weighted Application Mann-Whitney U and Regression Method

As noted earlier, the use of the Mann-Whitney U as a screening device was not of major importance, since only twelve variables were at least ordinal in nature. Inspection of the outcome did, nonetheless, exclude five variables which did not achieve statistical significance and provide interesting and useful information. The decision rule was set so that variables not achieving a $p \leq .05$ level were excluded from further consideration. These variables, along with the mean ranks of tenure groups and reported significance levels, are identified in Table 9. The

remaining variables, presented in Table 10, represent the variables retained for analysis using stepwise regression.

TABLE 9

VARIABLES EXCLUDED AFTER MANN-WHITNEY U TEST

Variable	Mean Rank* ST	LT	Significance
EDUC	56.9	54.5	p = .34
WGINC4	60.6	67.3	p = .08
LOSJ3	52.8	60.6	p = .09
LOSJ4	62.9	72.1	p = .07
COMPLETE	77.0	71.1	p = .21

*SL = short-tenured; LT = long-tenured

TABLE 10

VARIABLES INCLUDED AFTER MANN-WHITNEY U TEST

Variable	Mean Rank* ST	LT	Significance
STARTDAT	64.3	52.7	p = .03
WORKEXP	69.0	52.3	p = .00
WGINC1	28.7	47.1	p = .00
WGINC2	29.8	54.2	p = .00
WGINC3	42.4	52.7	p = .02
LOSJ1	38.4	65.3	p = .00
LOSJ2	38.1	69.5	p = .00

*SL = short-tenured; LT = long-tenured

Development of Item Weights

The final model was constructed using stepwise regression to analyze the seven variables determined significant in the Mann-Whitney U analysis and those nominally coded variables identified through the chi-square analysis. Initially, three of the fourteen variables--REFSORCE (referral source), LOSJ1 (the reported length of service at most recent job), and LOSJ2 (the reported length of service for the second most recent job)--were included in the model. This model, however, produced a constant (B_0) of 27.86 weeks, which pushed all predictions of the holdout group into the long-tenured class ($\geq$ 24 weeks).

To compensate for this, the model was forced to pass through the origin, thereby eliminating the impact of a large constant. Using this option, the new model, consisting of only two of the three biodata items, LOSJ1 and LOSJ2, took the form:

$$\text{Tenure} = .01905*\text{LOSJ1} + .01013*\text{LOSJ2}.$$

Criterion-Related Validity--Mann-Whitney U and Regression Weighted Application Blank

When the model was tested on the holdout data, a problem similar to the one identified in the first model regarding Type I errors appeared. As noted in Figure 13, nineteen (79.2 percent) of the applications from long-tenured employees were misclassified by the model. With

only 80 percent of the applications from short-tenured employees correctly classified, it appears this model may be slightly less effective than the first at controlling Type II errors.

		Actual: Short-Tenure	Actual: Long-Tenure
Predicted	Short-Tenure	24 (80.0%)	19 (79.2%)
	Long-Tenure	6 (20.0%)	5 (20.8%)

Figure 13. Predicted versus actual tenure classification regression model using holdout data

As discussed, the model developed using the discriminant function correctly classified just over 90 percent of the short-tenured group yielding a Type II error rate of less than 10 percent, as compared to 20 percent for the regression model. An interesting point is that both models had similar levels of Type I and Type II errors, but with different variables represented.

Test of Two Models

The second hypothesis:

> By scaling the data and using Mann-Whitney U to screen significant items for ordinal, interval, and ratio data in conjunction with the chi-square test of independence (for nominal data), followed by stepwise regression to develop item weights and the final prediction model, the percentage of individuals correctly classified by the experimental weighted application blank will be greater than those correctly classified using the currently accepted weighted application blank strategy;

was tested using the McNemar test. The McNemar test failed to indicate any difference in either model's predictive validity over the other. The upper left and lower right quadrants of Figure 14 identify the number of times one

Discriminant	Freq. Class Pct.	Regression: Incorrect(-)	Regression: Correct(+)
	Correct (+)	7 +- (14.0%)	23 ++ (46.0%)
	Incorrect (-)	14 -- (28.0%)	6 -+ (12.0%)

Figure 14. McNemar Fourfold Table of Frequencies

model correctly predicted group membership while the other was incorrect. Based on the information presented in Figure

14 and the chi-square table in Appendix C of Siegal (1956), the decision rule was to fail to reject the null hypothesis at the five percent level. That is, it was found that any differences in the models' predictive validity are simply a matter of chance.

Summary

The test conducted with respect to Hypothesis 1 indicated that the weighted application blank is significantly better at predicting tenure than the strategy currently used by the corporation. Based on the results of the binomial test, Hypothesis 1 is supported at the five percent level. Specifically, the decision was to reject the null hypothesis that no difference exists between the accuracy of the weighted application and the current selection experience.

Respective of Hypothesis 2, no difference was found between the predictive accuracy of the weighted application blank developed using the chi-square/discriminant method and the weighted application developed using the Mann-Whitney U/regression method. That is, the decision was to fail to reject the null hypothesis at the five percent level.

The use of Mann-Whitney U appeared redundant when used in conjunction with regression, as few independent variables possessed true ordinal characteristics. However, important

information was gained that would not have otherwise been evident. Further analysis using stepwise regression identified the employee's length of service in their last two jobs as the most important determinant of tenure.

Both models may be of limited usefulness, however, until further research can be conducted. While more than 90 percent of the short-tenured employees were correctly identified using the first model, and 80 percent were identified with the second, the applicant pool cannot support such a large number of Type I errors. The administrators of the facilities included in this study indicated that they frequently have only two or three applicants to choose from.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Introduction

This research has provided interesting and important information regarding both hypotheses. Of even greater importance are the implications for further research. This chapter provides a discussion of relevant factors identified during the study. The chapter begins with an assessment of information gleaned through the development of the chi-square/discriminant analysis process, proceeds through the Mann-Whitney U/regression procedure, and concludes with an analysis of the two processes' overall effectiveness.

Chi-Square Item Analysis

The value of using the chi-square test of independence became evident early in the first stage of the analysis. First, it served as a gross screening process, reducing the number of independent variables by more than half. Use of the information obtained in the initial analysis made it possible to collapse related cells and reclassify the variables based on quantitative, rather than qualitative bases. The information provided through the chi-square test

identified fourteen items as being significant at the five percent level.

Based on information provided by Muchinsky and Tuttle (1979), the identification of fourteen significant independent variables (referred to by Muchinsky and Tuttle as biodata predictors) is in the upper range of the number of significant relationships reported in other weighted application studies. The average number of such relationships reported in weighted application blank studies is just under ten, with a range of three to sixteen.

A point of concern and source of criticism of weighted application research pertains to the failure of the researchers to provide relevant discussion of the independent variables they have identified as possessing a significant relationship to the criterion (Pace and Schoenfeldt 1977; Muchinsky and Tuttle 1979).

Pace and Schoenfeldt (1977) note concern over simply accepting such relationships as valid, as the potential exists to create an "illusion of validity" as a function of the very nature of weighted application blank development. These points are addressed in Table 11, which provides a brief description of each significant biodata item and the final coding classifications.

Aside from the fact that these variables were statistically significant, interesting patterns in the

TABLE 11

VARIABLE LABEL AND DESCRIPTION
CHI-SQUARE ANALYSIS

Variable	Description	Classification
REFSORCE	Source of referral	1 = Newspaper 2 = Referred by some person or agency 3 = Walk-in 4 = Left blank
CUREMP	Currently employed	1 = No 2 = yes 3 = Left blank/cannot determine
CONTPRES	Allow contact with current employer	1 = Left blank--not currently employed 2 = No 3 = Yes 4 = Left blank
CORSTUD	Courses studied	1 = Left blank 2 = Listed specific area of study 3 = Wrote "general"
DIPLOMA	Diploma listed	1 = Indicated no diploma received 2 = Left blank 3 = Listed one or more diploma(s) received
LOS	Number of times length of service indicated	1 = Provided for 1/2 or more of jobs listed 2 = Provided for fewer than 1/2 of all jobs listed
NUMEMP	Number of employer names provided	1 = At least 1/2 complete or understandable 2 = Less than 1/2 complete or understandable

Table 11--Continued

Variable	Description	Classification
NUMADD	Number of complete employer addresses	1 = All complete or partially provided 2 = At least one missing
NUMWAGE	Number of wage rates listed	1 = At least 1/2 listed 2 = Less than 1/2 listed
NUMJTIT	Number of complete job titles	1 = At least 1/2 listed 2 = Less than 1/2 listed
NUMRSN	Number of complete reasons for leaving	1 = At least 1/2 listed 2 = Less than 1/2 listed
LOSLJOB	Length of service last job	1 = Less than one year 2 = At least one year 3 = Left blank/cannot determine
LOSAVG	Average length of service--all jobs	1 = Less than 6 months--all provided 2 = Some missing--cannot average 3 = At least 6 months--all complete
WRKRPT	Completeness of work history	1 = All complete 2 = Some work history left blank

biodata were apparent that would otherwise have gone unnoticed if the chi-square analysis had not been performed and discriminant analysis had been the only procedure employed. To assist in identifying these patterns, the classifications for each variable presented in Table 11 have

been purposely coded to indicate a general order. For example, the row and column percents for each classification with respect to the variable REFSORCE (referral source) are presented in Figure 15.

		REFSORCE Cell Category				
		1	2	3	4	
TENURE	SHORT-	33	43	22	2	ROW %
	TENURED	80	73	48	17	COLUMN %
	LONG-	12	34	34	18	ROW %
	TENURED	20	17	52	83	COLUMN %

Figure 15. Frequency of referral source response as row and column percentages

Note general order of magnitude within and between the different classifications. As the classification increases from one to four, so does the trend in the ratio of long- to short-tenured employees. This is not meant to indicate that the data are ordinal in nature, they are not. The "re-labeling" simply facilitates the identification of a general trend.

With this trend in mind, the point made earlier about the propensity of long-tenured employees to leave information unreported can be furthered. Cell category 4, as indicated in Figure 15, identifies applicants who were requested to provide a referral source but did not. As

shown, 18 percent of the long-tenured employees failed to provide the information, while only 2 percent of the short-tenured employees failed to do so. Of all individuals leaving this information blank, 83 percent were long-tenured. This pattern appears to be meaningful, as it is evident in all of the significant (and many of the excluded) variables. In fact, a variable was created to provide insight into this notion. The variable WRKRPT, an individual's propensity to complete work history sections, adds support to the contention that long-tenured employees had a propensity to leave requested information blank. As noted in Figure 16, fifty-eight of eighty-three long-tenured

	WRKRPT Cell Category 1	2	ROW TOTALS
SHORT-TENURED	39	52	91
LONG-TENURED	58	25	83
COLUMN TOTALS	97	77	174

Chi-Square	D.F.	Significance
11.77651	1	.0006

Figure 16. Crosstabulations: Tenure by completeness of work history

employees left at least one portion of their previous work history blank, as compared to only thirty-nine of ninety-one short-tenured employees (1 = portion left blank, 2 = all complete).

The implications of this may be important for several reasons. First, the positions in question (aide, orderly, housekeeping, and kitchen help) require very little formal education. A number of informal conversations with nursing home administrators and gerontologists indicates a large number of these employees are "under-educated." While no related documentation could be found, this may be one consideration.

Because there is no career path for these employees, it is possible that only individuals who cannot compete in the increasingly information/communication based industries, or advance into higher paying, more prestigious jobs remain in these positions. Respective of the short-tenured employees, an interesting inference can then be made concerning the greater propensity of this group to provide complete information. It is possible that these jobs, relatively abundant regardless of the state of the economy, are easy stepping stones, and considered temporary until a more attractive job becomes available. Aside from needing to look good on paper because of the apparent job hopping pattern they exhibit, these individuals may simply be adept

at completing a routine application. If this and the preceding points are correct, developing a program of subsidized education/employment exchange, linked to some form of advancement opportunity, may promote a strong sense of commitment to the company and provide higher quality care to residents.

While the difference between long- and short-tenured employees relative to the number of previous jobs listed is statistically significant, as discussed, it cannot be used in the prediction model. This is due to the fact that the number of previous jobs in each group "flip-flops" between one and two previous jobs, and three and four previous jobs. Nonetheless, there is an indication that short-tenured employees had more previous jobs on average. It must be noted, however, that thirty-two of the short-tenured employees, almost 35 percent, held four (or more) jobs, while only fourteen of eighty four, or 16 percent of the long-tenured employees reported as many previous employment experiences. Additionally, the average number of jobs held by short-tenured employees was 2.7, while for long-tenured employees the average was 2.4.

Another point worth noting concerns the trend that appears in the variable REFSORCE, the source of referral that directed the individual to apply for the position (p = .0015, $\underline{X}^2$ = 19.64). In general, more short-tenured than

long-tenured employees (32 percent compared to 12 percent) were referred for employment through newspaper advertisements. Alternately, a higher percentage of long-tenured versus short-tenured employees (34 percent compared to 21 percent) were likely to be "walk-ins"--persons who apply without external prompts or referrals. Forty-three percent of the short-tenured employees were referred by a current employee, relative, or friend, while 34 percent of the long-tenured employees reported such a referral source.

As reported by Mathis and Jackson (1991), information concerning the recruiting or referral source is not as important as once thought. Milkovich and Boudreau (1991), however, provide a convincing discourse of relevant research concerning this subject. They contend that when properly implemented, the use of current employees as a referral source is one of the best methods to secure successful recruits. One important note from their review concerns referrals by current workers and the work environment. It appears that in companies with poor working conditions and unfavorable work climates employee referrals do not have a significant positive effect on new hire tenure. The information gleaned through this study provides support for this contention, and may have important implications to the corporation participating in this study from two perspectives.

First, the very nature of the long-term care industry may pose the greatest obstacle when trying to promote and maintain a positive work environment. Efforts to overcome these barriers must be undertaken with greater zeal to promote an environment conducive to employee retention. It is possible that a program designed to promote intrinsic rewards could shift the focus of employees away from negative factors and toward the creation of a positive work environment.

Second, and related to the first point, is the fact that a fairly large bonus ($250.00) has been given, during various bonus programs, to employees who referred a new employee. Because of the information revealed through this study regarding the success of employee-based referrals, the president of the corporation is planning to increase the size of the bonus and split the "reward" into a three point distribution to promote the program's efficacy. This plan makes the total package worth $500 to the referring employee, who would receive $100 three months after the initial hire date, another $200 after the new hire has been employed six months, and a final $200 after one year of continuous employment. The logic behind this is to encourage greater scrutiny on the part of current employees when referring potential employees.

In all, the information produced using the chi-square test of independence proved beneficial, and many interesting trends emerged. Actually, without this step many variables of a significant but spurious nature could have been included in the final model. It was only through individual consideration that the actual value of each variable could be determined.

Discriminant Analysis and Prediction Model

As indicated in the results chapter, the stepwise discriminant procedure retained seven variables, REFSORCE, CONTPRES, CORSTUD, NUMADD, LOSAVG, NUMWAGE, and NUMRSN, for use in the prediction model. All of the variables except REFSORCE ($p = .0012$) were significant at the $p < .001$ level. In addition, an evaluation of the functions at the group centroids indicates that a highly significant ($p < .001$, $F = 8.6335$, df = 7,79) difference exists between the two groups. This difference is supported by the results of the test of hypothesis 1.

Realizing an initial correct classification rate of 78 percent was quite encouraging. By excluding applications with classification scores within ± 10 percent of the cutoff score, this rate was increased to slightly over 87 percent. Of these, almost 83 percent of the long-tenured employee applications and over 89 percent of the short-tenured employee applications were correctly classified. This

accounts for Type I and Type II error rates of only 17.2 percent and 10.9 percent, respectively. While the test on the holdout group (hypothesis 1) was much less notable, the weighted application was still significantly better than the current selection process.

Problems with the prediction model remain a quandary. As noted earlier, cross-validation revealed significant problems with respect to Type I errors. Only 12 percent of the long-tenured employees were correctly classified, yielding a Type I error rate of 88 percent. While effective at identifying short-tenured employees, with over 90 percent correctly identified, the available labor pool for the positions in question is not adequate to support such a high incidence of Type I errors.

Conversations with facility administrators indicate that many times few choices among applicants exist. This may be an indication of problems with recruiting strategies or may allude a larger problem--that few are interested in working in this unique, demanding, and often demeaning environment. The implications of this are far reaching and a point for further study.

When considering the average annual turnover rate experienced by the company, however, the importance of refining the weighted application becomes clear. In 1991, the company hired approximately 1,900 new employees to fill

positions left vacant through functional and dysfunctional turnover. Based on an average employment level of 1,100 employees, the company experienced a turnover rate of 163 percent. Further, the company president estimated that 50 percent of the aides are long-tenured and could be counted on not to separate from the organization. Taking this into consideration, 50 percent of the employees separate from the corporation at a rate of over 300 percent per year. It must also be noted that no direct comparison can be made between this and the error rates yielded by the model without a longitudinal assessment.

Mann-Whitney U/Regression Weighted Application Blank

Several important pieces of information were obtained from this portion of the research. First, the Mann-Whitney U analysis identified differences between groups that cannot be logically explained, yet draw attention to factors related to current hiring practices. For example, the average length of service at the most recent job listed (LOSJ1, $p < .01$) was just over 65 weeks for the long-tenured group, but it was only 38.4 weeks for the short-tenured employees. A slightly greater difference was identified in the reported length of service for the second most recent job (LOSJ2, $p < .01$). In this, the mean reported employment period was 69.5 weeks for long-tenured employees and 38.1

for short-tenured. Reviewing the raw applications also reveals this trend, and forces one to wonder if past tenure should considered more heavily by the facility's personnel. Perhaps the aforementioned problem of an inadequate applicant pool is one factor of importance. Another point suggested by the differences in length of service is the fact that the cutoff criterion developed for this study may be inadequate for effectively predicting tenure in this environment.

Similar to the experience with reports of past tenure, the long-tenured group also reported higher average wage increases than the short-tenured employees. The average total wage increase indicated for the most recent job (WGINC1, $p < .01$) was 47.1¢ for long-tenured employees, but only 28.7¢ for the short-tenured group. The reported total wage increase for the second most recent job (WGINC2, $p < .01$) was 54.2¢ and 29.8¢ for long- and short-tenured employees respectively.

Because of the continuous nature of the data, and the results yielded in the previous analysis, the model produced using stepwise regression was only tested on the holdout group. The results of this test were not inconsistent with the outcome of the model produced using chi-square and discriminant analysis. Eighty percent of the short-tenured applications were correctly classified, while only five,

just under 21 percent, of the long-tenured applications were correctly identified. Nineteen of twenty-four long-tenured applications were incorrectly classified, providing a Type I error rate of more than 79 percent.

While the first model only predicted 12 percent of the long-tenured group correctly, the difference in reported percentages between the two models is a function of the holdout group size. Using the regression model, one short-tenured and seven long-tenured applications were excluded because at least one discriminating variable had missing data. This is also consistent with the general trend of missing data found during the chi-square analysis.

After assessing the difference between the two methods using the McNemar test, no significant benefit was realized by using one model over the other. Since similar biodata predictors were identified using both techniques, it is evident that the increased information provided by higher level data is of little predictive value. In fact, while the chi-square procedure was the most complex and time consuming, it may be the most "information rich" source for this work environment.

The fact that similar cross-validation results were realized using both models is potentially important when considering the outcome of this study. The implication is that the models may not be the cause of the high Type I

error rate. If this is indeed the case, it may be that the holdout group was inadequate, and does not truly reflect the target population. This is considered further in the following section.

Recommendations for Further Research

In light of the inconclusive nature of the cross-validation analysis, further research is needed to determine the true predictive validity of the weighted application in the long-term care industry. To promote such a project, the president of the corporation used for this study has agreed to participate in a longitudinal assessment of the weighted application. This effort will incorporate the use of the newly developed application and include the applications of all new hires for a period of six months. These individuals will be selected without regard to the weighted application score, which will be compared to turnover rates six months after they are hired.

The information gleaned from the chi-square analysis suggests that additional research is needed to identify specific demographic characteristics of the long-tenured employees. This information will help develop a profile of successful employees which could be used to further enhance management's ability to develop higher levels of commitment.

Related to this, it appears evident, from comments made by the some of the employees on their applications that a

degree of empathy and nurturing exists among long-tenured employees. This lends credence to the need for additional research concerning the value structure of individuals employed in this industry. It would be quite interesting to determine if a difference in general values exists between successful and non-successful nursing home employees. Through this, a better "fit" between the employee and the job may be realized. In addition, inclusion of a tool such as the Rokeach Value Survey (1973) would allow comparison to employees in many different industries, as extensive "norm" tables have been established through years of research, thereby enhancing the existing knowledge base.

APPENDIX A

QUALITY HEALTH CARE EMPLOYMENT APPLICATION

WE ARE AN EQUAL OPPORTUNITY EMPLOYER

APPLICATION FOR EMPLOYMENT

HILLSIDE MANOR
114 East Green Street
Glenwood, Iowa 51534

We consider applicants for all positions without regard to race, color, religion, sex, national orgin, age, marital or veteran status, the presence of a non-job-related medical condition or handicap, or any other legally protected status.

(PLEASE PRINT)

Position(s) Applied For	Date of Application

How Did You Learn About Us?

___Walk-In ___Friend ___Newspaper (specify)_____

___Employment Agency ___Relative ___Other Employee_____

Last Name	First Name	Middle Name

Address Number	Street	City	State	Zip Code

Telephone Number(s)	Social Security Number

If you are under 18 years of age, can you provide required proof of eligibility to work? ___Yes ___No

If Yes, give date _____

Have you ever been employed with us before? ___Yes ___No

If Yes, give date _____

Are you currently employed? ___Yes ___No

May we contact your present employer? ___Yes ___No

On what date would you be available for work? _____

Are you available to work: ___ Full Time ___ Part Time

Have you ever been convicted of a felony/child abuse or adult abuse? ___Yes ___No
(Conviction will not necessarily disqualify an application from employment.)

If Yes, please explain_____

_____

EDUCATION

	Elementary School					High School				Undergraduate College/University				Graduate/ Professional			
School Name & Location																	
Years Completed	4	5	6	7	8	9	10	11	12	1	2	3	4	1	2	3	4
Diploma/Degrees																	
Describe Course of Study																	

Describe any specialized training, apprenticeship, skills & extra-curricular act.	
Describe any honors you have received	
State any additional information you feel may be helpful to us in considering your app.	

List professional, trade, business or civic activities and offices held.
You may exclude memberships which would reveal sex, race, religion, national origin, age, ancestry, or handicap or other protected status:

_____

_____

_____

_____

REFERENCES

Give name, address and telephone number of three references who are not related to you and are not previous employers.

1. _____

2. _____

3. _____

Have you ever had any job-related training in the United States Military? ____Yes ____No

If Yes, please describe _____

_____

Do you have any disability which would substantially interfere with your ability to perform the duties of the job for which you have applied? ____Yes ____No

EMPLOYMENT EXPERIENCE

Start with your present or last job. Include any job-related military service assignments and volunteer activities. You may exclude organizations which indicate race, color, religion, gender, national origin, handicap or other protected status.

1. Employer		Length of Service	WORK PERFORMED
Address			
Telephone Number(s)		Hourly Rate/Salary: Starting / Final	
Job Title	Supervisor		
Reason for Leaving			
2. Employer		Length of Service	WORK PERFORMED
Address			
Telephone Number(s)		Hourly Rate/Salary: Starting / Final	
Job Title	Supervisor		
Reason for Leaving			
3. Employer		Length of Service	WORK PERFORMED
Address			
Telephone Number(s)		Hourly Rate/Salary: Starting / Final	
Job Title	Supervisor		
Reason for Leaving			
4. Employer		Length of Service	WORK PERFORMED
Address			
Telephone Number(s)		Hourly Rate/Salary: Starting / Final	
Job Title	Supervisor		
Reason for Leaving			

If you need additional space, please continue on a separate sheet of paper.

SPECIAL SKILLS AND QUALIFICATION

Summarize special job-related skills and qualifications acquired from employment or other experience.

APPLICANT'S STATEMENT

I certify that answers given herein are true and complete to the best of my knowledge.

I authorize investigation of all statements contained in this application for employment as may be necessary in arriving at an employment decision.

This application for employment shall be considered active for a period of time not to exceed 90 days. Any applicant wishing to be considered for employment beyond this time period should inquire as to whether or not applications are being accepted at that time.

The applicant understands that neither this document nor any offer of employment from the employer constitute an employment contract unless a specific document to that affect is executed by the employer and employee in writing.

In the event of employment, I understand that false or misleading information given in my application or interview(s) may result in discharge. I understand, also, that I am required to abide by all rules and regulations of the employer.

_____
Signature of Applicant Date

FOR PERSONNEL DEPARTMENT USE ONLY

Arrange Interview ____Yes ____No

Remarks _____

_____ _____
Interviewer Date

Employed ____Yes ____No Date of Employment _____

Job Title _____ Hourly Rate/ Salary _____ Department _____

By _____ _____
Name and Title Date

NOTES _____

APPENDIX B

CODING INSTRUCTIONS AND OUTPUT TABLES

FIRST RUN

Coding Instructions & First Run Chi-Square
Test of Independence Output Tables

CROSSTABULATIONS: TENURE BY APPLICATION DATE

	1	2	3	ROW TOTALS
SHORT-TENURED	2	0	90	92
LONG-TENURED	6	2	68	76
COLUMN TOTALS	8	2	158	168

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
5.59019	2	.0611	.905	4 OF 6 (66.7%)

Variable: APPDATE
Description: Date of application
1 = left blank
2 = partial date
3 = complete date

CROSSTABULATIONS: TENURE BY APPLICANT NAME

	2	3	ROW TOTALS
SHORT-TENURED	15	77	92
LONG-TENURED	12	72	84
COLUMN TOTALS	27	149	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.09361	2	.5788	6.259	NONE

Variable: NAME
Description: Applicant name
1 = left blank
2 = last name only
3 = first initial & last name
4 = first & last name
5 = first, M.I., & last name
6 = first, middle, & last name

CROSSTABULATIONS: TENURE BY STREET

	1	2	3	ROW TOTALS
SHORT-TENURED	0	1	91	92
LONG-TENURED	3	1	80	84
COLUMN TOTALS	3	2	171	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
3.35089	2	.1872	.955	4 OF 6 (66.7%)

Variable: STREET

Description:
Street identified
1 = left blank
2 = incomplete
3 = complete

CROSSTABULATIONS: TENURE BY CITY

	1	2	3	ROW TOTALS
SHORT-TENURED	0	7	85	92
LONG-TENURED	1	5	78	84
COLUMN TOTALS	1	12	163	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.27294	2	.5292	.477	2 OF 6 (33.3%)

Variable: CITY

Description:
City identified
1 = left blank
2 = included

CROSSTABULATIONS: TENURE BY STATE

	1	2	3	ROW TOTALS
SHORT-TENURED	0	81	11	92
LONG-TENURED	1	63	20	84
COLUMN TOTALS	1	144	31	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
5.51065	2	.0636	.47	2 OF 6 (33.3%)

Variable: STATE

Description:
State identified
1 = left blank
2 = included abbreviation
3 = full name listed

CROSSTABULATIONS: TENURE BY ZIP

	1	2	3	ROW TOTALS
SHORT-TENURED	2	89	1	92
LONG-TENURED	2	80	0	82
COLUMN TOTALS	4	169	1	174

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
.90757	2	.6352	.471	4 OF 6 (66.7%)

Variable: ZIP

Description:
Zip included
1 = left blank
2 = included
3 = zip+4

CROSSTABULATIONS: TENURE BY TELEPHON

	1	2	3	4	ROW TOTALS
SHORT-TENURED	4	2	54	32	92
LONG-TENURED	9	0	41	33	83
COLUMN TOTALS	13	2	95	65	175

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
5.26849	3	.1532	.949	2 OF 8 (25%)

Variable: TELEPHON

Description:
Home phone
1 = blank
2 = incomplete 7 digit
3 = complete 7 digit/"no phone" indicated
4 = included area code

CROSSTABULATIONS: TENURE BY SOCIAL SECURITY NUMBER

	1	3	ROW TOTALS
SHORT-TENURED	0	92	92
LONG-TENURED	2	82	84
COLUMN TOTALS	2	174	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
.60313	1	.4374	.955	2 OF 4 (50%)

Variable: SSN

Description:
Social security number
1 = left blank
2 = incomplete
3 = complete

CROSSTABULATIONS: TENURE BY AGE AFFIRMATION

	1	2	3	4	5	ROW TOTALS
SHORT-TENURED	42	13	14	9	5	83
LONG-TENURED	28	2	10	9	0	49
COLUMN TOTALS	70	15	24	18	5	132

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
8.32830	4	.0803	1.856	2 OF 10 (20%)

Variable: AGE

Description:
Provide proof of age
1 = left blank
2 = no
3 = yes, no date provided
4 = yes, date provided
5 = wrote N/A

CROSSTABULATIONS: TENURE BY PREVIOUSLY EMPLOYED FOR QUALITY HEALTH CARE

	1	2	3	4	ROW TOTALS
SHORT-TENURED	0	80	2	8	90
LONG-TENURED	1	50	1	6	58
COLUMN TOTALS	1	130	3	14	148

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.70281	3	.6363	.392	4 OF 8 (50%)

Variable: EMPBEFR

Description:
Previously employed with Quality Care
1 = left blank
2 = no
3 = yes, no date provided
4 = yes, date provided

CROSSTABULATIONS: TENURE BY CURRENTLY EMPLOYED

	1	2	3	ROW TOTALS
SHORT-TENURED	1	47	40	88
LONG-TENURED	3	25	39	67
COLUMN TOTALS	4	72	79	155

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
4.98115	2	.0829	1.729	2 OF 6 (33.3%)

Variable:	Description:
CUREMP	Currently employed 1 = left blank 2 = no 3 = can't tell 4 = yes

CROSSTABULATIONS: TENURE BY PERMISSION TO CONTACT EMPLOYER

	1	2	3	4	ROW TOTALS
SHORT-TENURED	2	27	6	55	90
LONG-TENURED	10	14	3	38	65
COLUMN TOTALS	12	41	9	93	155

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
9.78511	3	.0205	3.774	1 OF 8 (12.5%)

Variable:	Description:
CONTPRES	Contact present employer 1 = left blank 2 = left blank--not currently employed 3 = no 4 = marked no to CUREMP 5 = yes

CROSSTABULATIONS: TENURE BY DATE AVAILABLE TO START

	1	2	3	4	5	6	7	8	9	ROW TOTALS
SHORT-TENURED	10	1	5	1	3	0	29	33	8	90
LONG-TENURED	8	3	3	1	3	1	9	27	0	55
COLUMN TOTALS	18	4	8	2	6	1	38	60	8	145

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
14.22932	8	.0760	.379	12 OF 18 (66.7%)

Variable: DATEWORK

Description:
Date can start work
1 = left blank
2 = listed incomplete date > 2 weeks
3 = listed complete date > 2 weeks
4 = listed inc date 1 to 2 weeks
5 = listed complete date 1 to 2 weeks
6 = listed inc date < 1 week
7 = listed complete date < 1 week
8 = listed date or wrote "today/anytime"

CROSSTABULATIONS: TENURE BY PREFER FULL OR PART TIME WORK

	1	2	3	4	5	6	ROW TOTALS
SHORT-TENURED	4	17	3	6	42	15	87
LONG-TENURED	1	8	10	10	22	4	55
COLUMN TOTALS	5	25	13	16	64	19	142

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
16.03047	5	.0068	1.937	2 OF 12 (16.7%)

Variable: FULLTIME

Description:
Work status
1 = left blank
2 = part time
3 = listed 1 specific 8 hr. shift--full time
4 = listed 2 shifts--full time
5 = full time--any
6 = full or part time

CROSSTABULATIONS: TENURE BY SCHOOL IDENTIFICATION

	1	2	3	4	5	ROW TOTALS
SHORT-TENURED	6	31	13	42	0	92
LONG-TENURED	6	29	9	31	1	76
COLUMN TOTALS	12	60	22	73	1	168

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.94531	4	.7458	.452	2 OF 10 (20%)

Variable: SCHNAME

Description: School identification
1 = left blank
2 = names only
3 = names and some/incomplete addresses
4 = names and complete addresses
5 = 3 of 4 complete

CROSSTABULATIONS: TENURE BY COURSES STUDIED

	1	2	3	4	ROW TOTALS
SHORT-TENURED	43	16	20	9	88
LONG-TENURED	16	31	11	4	62
COLUMN TOTALS	59	47	31	13	150

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
17.70440	3	.0005	5.373	NONE

Variable: CORSTUD

Description: Courses studied
1 = left blank
2 = general
3 = listed specific area--not HC related
4 = listed specific area--HC related

CROSSTABULATIONS: TENURE BY DIPLOMA LISTED

	1	2	3	ROW TOTALS
SHORT-TENURED	49	6	32	87
LONG-TENURED	18	7	37	62
COLUMN TOTALS	67	13	69	149

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
10.89460	2	.0043	5.409	NONE

Variable: DIPLOMA

Description: Diploma listed
1 = left blank
2 = no
3 = only for highest degree earned
4 = all listed

CROSSTABULATIONS: TENURE BY SPECIALIZED TRAINING

	1	2	3	4	5	6	ROW TOTALS
SHORT-TENURED	45	0	7	7	30	1	90
LONG-TENURED	39	4	3	7	15	0	68
COLUMN TOTALS	84	4	10	14	45	1	158

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
9.14254	5	.1035	.430	5 OF 12 (41.7%)

Variable: TRAINING

Description: Specialized training
1 = left blank
2 = indicated none
3 = listed extracurricular activity
4 = listed training--not directly related
5 = listed work related training
6 = listed training--not related

CROSSTABULATIONS: TENURE BY HONORS RECEIVED

	1	2	3	4	5	ROW TOTALS
SHORT-TENURED	65	5	4	1	6	81
LONG-TENURED	10	4	2	1	0	17
COLUMN TOTALS	75	9	6	2	6	98

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
9.26781	5	.0988	.173	9 OF 12 (75%)

Variable: HONORS

Description: Honors received
1 = nothing listed
2 = one social or academic honor listed
3 = two social or academic honors listed
4 = three social or academic honors listed
5 = wrote "none"

CROSSTABULATIONS: TENURE BY MEMBERSHIP IN OTHER ACTIVITIES

	1	2	3	4	5	6	7	8	ROW TOTALS
SHORT-TENURED	68	5	3	3	0	1	1	0	81
LONG-TENURED	11	4	0	2	1	0	0	1	19
COLUMN TOTALS	79	9	3	5	1	1	1	1	100

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
16.24057	7	.0230	.19	13 OF 16 (81.3%)

Variable: MMBRSHP

Description: Membership in professional/social org.
1 = nothing listed
2 = wrote "N/A"
3 = one organization listed
4 = two organizations listed
5 = three organizations listed
6 = four organizations listed
7 = five organizations listed
8 = six organizations listed

CROSSTABULATIONS: TENURE BY DISABL

	1	2	3	4	ROW TOTALS
SHORT-TENURED	5	1	85	1	92
LONG-TENURED	7	5	71	0	83
COLUMN TOTALS	12	6	156	1	175

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
4.80626	3	.1865	.474	4 OF 8 (50%)

Variable: DISABL
Description: Any impedance to job
1 = left blank
2 = yes
3 = no

CROSSTABULATIONS: TENURE BY APPLICANT HAD TRAINING IN MILITARY

	1	2	4	ROW TOTALS
SHORT-TENURED	2	77	2	81
LONG-TENURED	2	29	1	32
COLUMN TOTALS	4	106	3	113

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.01161	2	.6030	.350	4 OF 6 (66.7%)

Variable: TRANMIL
Description: Train in military
1 = left blank
2 = no
3 = yes, no description
4 = yes, description included

CROSSTABULATIONS: TENURE BY THE NUMBER OF REFERENCE NAMES LISTED

	1	2	3	4	5	ROW TOTALS
SHORT-TENURED	7	3	10	71	1	92
LONG-TENURED	9	7	11	48	0	75
COLUMN TOTALS	16	10	21	119	1	167

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
5.67123	4	.2251	.449	3 OF 10 (30%)

Variable: REFNAME

Description:
Reference names provided
1 = left blank
2 = one name provided
3 = two names provided
4 = three names provided--all provided
5 = four names provided

CROSSTABULATIONS: TENURE BY THE NUMBER OF REFERENCES ADDRESSES LISTED

	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	10	12	6	38	1	7	18	92
LONG-TENURED	8	2	2	37	2	8	16	75
COLUMN TOTALS	18	14	8	75	3	15	34	167

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
8.25102	6	.2203	1.347	4 OF 14 (28.6%)

Variable: REFADD

Description:
Reference address provided
1 = none provided and #1 REFNAME
2 = none provided and #2, 3, or 4 REFNAME
3 = some incomplete addresses provided, some blank
4 = inc addresses provided for all
5 = some complete addresses, some blank
6 = some comp & some inc, all provided
7 = comp addresses provided for all

CROSSTABULATIONS: TENURE BY NUMBER OF TELEPHONE NUMBERS LISTED

	0	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	1	6	7	19	2	33	5	11	84
LONG-TENURED	0	7	8	13	3	16	1	8	56
COLUMN TOTALS	1	13	15	32	5	49	6	19	140

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
6.15302	7	.5220	.4	6 OF 16 (37.5%)

Variable: REFTEL

Description:
Reference telephone provided
1 = none provided and #1 REFNAME
2 = none provided and #2, 3, or 4 REFNAME
3 = some 7 digit numbers, some blank
4 = some 10 digit numbers, some blank
5 = all 7 digit
6 = some 7 & some 10, all provided
7 = 10 digit numbers provided for all

CROSSTABULATIONS: TENURE BY WAGEINCR

	0	1	2	3	4	ROW TOTALS
SHORT-TENURED	1	9	12	26	42	90
LONG-TENURED	0	19	7	10	21	57
COLUMN TOTALS	1	28	19	36	63	147

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
13.25833	4	.0101	.388	2 OF 10 (20%)

Variable: WAGEINCR

Description:
Wage increase last job
0 = indicated #2 WORKEXP
1 = left blank
2 = incomplete
3 = no increase
4 = increase

CROSSTABULATIONS: TENURE BY LENGTH OF SERVICE

	0	1	2	3	4	5	6	7	8	ROW TOTALS
SHORT-TENURED	1	6	3	1	1	3	1	5	71	92
LONG-TENURED	1	15	8	0	0	1	1	3	55	84
COLUMN TOTALS	2	21	11	1	1	4	2	8	126	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
11.32137	8	.1841	.477	12 OF 18 (66.7%)

Variable: LOS

Description:
Length of service indicated
0 = indicated #2 WORKEXP
1 = left all blank
2 = incomplete
3 = 1/4 listed
4 = 1/3 listed
5 = 1/2 listed
6 = 2/3 listed
7 = 3/4 listed
8 = all complete

CROSSTABULATIONS: TENURE BY LOSLJOB

	0	1	2	3	4	5	ROW TOTALS
SHORT-TENURED	1	14	30	19	16	12	92
LONG-TENURED	2	21	13	8	13	27	84
COLUMN TOTALS	3	35	43	27	29	39	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
18.69030	5	.0022	1.432	2 OF 12 (16.7%)

Variable: LOSLJOB

Description:
Length of service last job
0 = indicated #2 WORKEXP
1 = left blank/incomplete--can't determine
2 = < 6 months
3 = 6 months to 1 year
4 = 1 year to 2 years
5 = > 2 years

CROSSTABULATIONS: TENURE BY NUMBER OF COMPLETE/ UNDERSTANDABLE EMPLOYER'S NAMES LISTED

	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	1	3	0	2	2	5	79	92
LONG-TENURED	1	13	1	0	4	1	64	84
COLUMN TOTALS	2	16	1	2	6	6	143	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
13.82168	6	.0317	.477	10 OF 14 (71.4%)

Variable: NUMEMP

Description:
Number of complete/understandable employer names
0 = indicated #2 WORKEXP
1 = left blank/none understandable
2 = 1/4 complete/understandable
3 = 1/3 complete/understandable
4 = 1/2 complete/understandable
5 = 2/3 complete/understandable
6 = 3/4 complete/understandable
7 = all complete/understandable

CROSSTABULATIONS: TENURE BY NUMWKPER

	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	1	10	1	4	1	3	65	85
LONG-TENURED	2	17	1	1	0	1	49	71
COLUMN TOTALS	3	27	2	5	1	4	114	156

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
6.99368	6	.3214	.455	10 OF 14 (71.4%)

Variable: NUMWPER

Description:
Number of complete work performed sections
1 = left all blank
2 = 1/4 listed
3 = 1/3 listed
4 = 1/2 listed
5 = 2/3 listed
6 = 3/4 listed
7 = all listed

CROSSTABULATIONS: TENURE BY NUMADD

	0	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	1	13	4	46	13	12	2	1	92
LONG-TENURED	1	39	4	17	16	4	0	3	84
COLUMN TOTALS	2	52	8	63	29	16	2	4	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
33.36485	7	.0000	.955	8 OF 16 (50%)

Variable: NUMADD

Description:
Number of complete employer addresses (street, city, & state)
0 = indicated #2 WORKEXP
1 = left all blank
2 = some blank/some partial
3 = all partial
4 = all complete
5 = some complete/some partial
6 = some complete/some partial/some blank
7 = some complete/some blank

CROSSTABULATIONS: TENURE BY NUMWKPER

	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	1	10	1	4	1	3	65	85
LONG-TENURED	2	17	1	1	0	1	49	71
COLUMN TOTALS	3	27	2	5	1	4	114	156

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
6.99368	6	.3214	.455	10 OF 14 (71.4%)

Variable: NUMWPER

Description:
Number of complete work performed sections
1 = left all blank
2 = 1/4 listed
3 = 1/3 listed
4 = 1/2 listed
5 = 2/3 listed
6 = 3/4 listed
7 = all listed

CROSSTABULATIONS: TENURE BY NUMEPHON

	0	1	2	3	4	5	6	7	8	ROW TOTALS
SHORT-TENURED	1	17	5	8	19	3	0	28	0	81
LONG-TENURED	0	11	0	6	3	0	1	16	1	38
COLUMN TOTALS	1	28	5	14	22	3	1	44	1	119

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
13.73624	8	.0889	.319	11 OF 18 (61.1%)

Variable: NUMEPHON

Description:
Number of complete employer phone numbers (7 digit and 10 digit as necessary)
0 = indicated #2 WORKEXP
1 = left all blank
2 = 1/4 listed
3 = 1/3 listed
4 = 1/2 listed
5 = 2/3 listed
6 = 3/4 listed
7 = all listed
8 = out of business/not applicable

CROSSTABULATIONS: TENURE BY NUMRSN

	0	1	3	4	5	6	7	8	ROW TOTALS
SHORT-TENURED	1	9	1	2	1	5	71	2	92
LONG-TENURED	1	17	3	4	4	3	48	4	84
COLUMN TOTALS	2	26	4	6	5	8	119	6	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
11.19975	7	.1301	.955	12 OF 16 (75%)

Variable: NUMRSN

Description:
Number of complete reasons for leaving
0 = indicated #2 WORKEXP
1 = left all blank
2 = 1/4 listed
3 = 1/3 listed
4 = 1/2 listed
5 = 2/3 listed
6 = 3/4 listed
7 = all listed
8 = one job, still employed
9 = 4/5 listed

CROSSTABULATIONS: TENURE BY NUMINCR

	0	1	2	3	4	5	6	7	8	9	ROW TOTALS
SHORT-TENURED	7	12	2	4	4	15	4	7	18	17	90
LONG-TENURED	15	9	1	2	3	2	4	3	10	8	57
COLUMN TOTALS	22	21	3	6	7	17	8	10	28	25	147

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
14.88962	9	.0940	1.163	9 OF 20 (45%)

Variable: NUMINCR

Description:
Number of jobs realizing wage increase
0 = left all blank
1 = incomplete
2 = left all but most recent blank
3 = 1/4 listed
4 = 1/3 listed
5 = 1/2 listed
6 = 2/3 listed
7 = 3/4 listed
8 = all complete
9 = no increase

CROSSTABULATIONS: TENURE BY NUMWAGE

	0	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	7	5	2	3	9	3	8	53	90
LONG-TENURED	19	11	0	4	0	4	4	35	74
COLUMN TOTALS	26	16	2	7	9	7	12	88	164

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
26.89546	7	.0003	.902	10 OF 16 (62.5%)

Variable: NUMWAGE

Description:
Number of wage rates listed
0 = left all blank
1 = all incomplete
2 = 1/4 listed
3 = 1/3 listed
4 = 1/2 listed
5 = 2/3 listed
6 = 3/4 listed
7 = all listed

CROSSTABULATIONS: TENURE BY NUMREL

	0	1	2	3	4	5	6	7	8	9	ROW TOTALS
SHORT-TENURED	3	5	22	7	5	18	4	2	25	1	92
LONG-TENURED	4	14	22	3	7	4	4	2	23	1	84
COLUMN TOTALS	7	19	44	10	12	22	8	4	48	2	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
14.99913	9	.0910	.955	9 OF 20 (45%)

Variable: NUMREL

Description:
Number of related work experiences
0 = left position applying for blank
1 = left all blank
2 = 0
3 = 1/4 listed
4 = 1/3 listed
5 = 1/2 listed
6 = 2/3 listed
7 = 3/4 listed
8 = all listed
9 = 4/5 listed

CROSSTABULATIONS: TENURE BY NUMJTIT

	0	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	1	8	2	1	2	2	4	66	86
LONG-TENURED	1	20	0	5	2	4	5	44	81
COLUMN TOTALS	2	28	2	6	4	6	9	110	167

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
14.85091	7	.0380	.970	12 OF 16 (75%)

Variable: NUMJTIT

Description:
Number of complete job titles
0 = indicated #2 WORKEXP
1 = left all blank
2 = 1/4 listed
3 = 1/3 listed
4 = 1/2 listed
5 = 2/3 listed
6 = 3/4 listed
7 = all listed

CROSSTABULATIONS: TENURE BY ADDITIONAL INFORMATION FOR CONSIDERATION

	1	2	3	4	5	6	8	10	11	12	13	14	ROW TOTALS
SHORT-TENURED	62	3	2	3	8	1	1	1	1	1	0	0	83
LONG-TENURED	11	1	6	1	2	0	0	0	0	0	1	1	23
COLUMN TOTALS	73	4	8	4	10	1	1	1	1	1	1	1	106

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
23.93738	11	.0130	.217	20 OF 24 (83.3%)

Variable: ADDINFO
Description:
Additional information for consideration
01 = nothing listed
02 = experience working with special students
03 = hobbies
04 = plan to attend school
05 = work well with people
06 = wrote "none"
07 = worked in hospital
08 = volunteer work
09 = see resume
10 = interested in nursing
11 = hours toward teaching certificate
12 = experience in dietary
13 = eager/like responsibility
14 = Chauffeur's license

CROSSTABULATIONS: TENURE BY SKILLS

	1	2	3	4	5	6	7	ROW TOTALS
SHORT-TENURED	49	15	8	6	4	4	1	87
LONG-TENURED	34	10	4	4	3	1	0	56
COLUMN TOTALS	83	25	12	10	7	5	1	143

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.74895	6	.9413	.392	8 OF 14 (57.1%)

Variable: SKILLS
Description:
Special skills and qualifications
1 = nothing listed
2 = 1 skill listed
3 = 2 skills listed
4 = 3 skills listed
5 = 4 skills listed
6 = 5 skills listed

CROSSTABULATIONS: TENURE BY NUMSNAM

	0	1	2	3	4	5	6	7	8	ROW TOTALS
SHORT-TENURED	1	13	5	2	16	2	8	26	17	90
LONG-TENURED	0	18	1	2	2	6	5	23	5	62
COLUMN TOTALS	1	31	6	4	18	8	13	49	22	152

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
20.31490	8	.0092	.408	8 OF 18 (44.4%)

Variable: NUMSNAM

Description:
Number of complete supervisor names
0 = indicated #2 WORKEXP
1 = left all blank
2 = 1/4 listed
3 = 1/3 listed
4 = 1/2 listed
5 = 2/3 listed
6 = 3/4 listed
7 = all listed
8 = all incomplete

CROSSTABULATIONS: TENURE BY DATESIGN

	1	2	3	ROW TOTALS
SHORT-TENURED	3	66	3	72
LONG-TENURED	6	35	5	46
COLUMN TOTALS	9	101	8	118

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
5.55577	2	.0622	3.119	3 OF 6 (50%)

Variable: DATESIGN

Description:
Dated signing
1 = no
2 = yes

CROSSTABULATIONS: TENURE BY RSNLAST

	0	1	2	3	4	5	6	7	8	9	10	11	ROW TOTALS
SHORT-TENURED	22	11	4	0	0	1	1	3	18	5	1	1	92
LONG-TENURED	16	21	3	1	2	2	2	3	10	5	2	1	83
COLUMN TOTALS	38	32	7	1	2	3	3	6	28	10	3	2	175

	12	13	14	15	16	17	18	19	22	ROW TOTALS
SHORT-TENURED	2	6	4	2	2	4	3	1	1	92
LONG-TENURED	3	4	1	3	2	1	1	0	0	83
COLUMN TOTALS	5	10	5	5	4	5	4	1	1	175

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
17.48433	20	.6213	.474	34 OF 42 (81%)

Variable: RSNLAST

Description:
Reason for leaving last job
0 = still employed
01 = left blank
02 = school
03 = marriage
04 = medical
05 = family
06 = take care of family member
07 = not enough work
08 = moved
09 = business ended
10 = hours/staffing
11 = too far away
12 = need more pay
13 = different job/growth opportunity
14 = laid off
15 = personal
16 = fired
17 = baby
18 = seasonal/temporary
19 = he died
20 = wrote "N/A"
21 = retired
22 = lack of advancement

CROSSTABULATIONS: TENURE BY LOSAVG

	0	1	2	3	4	5	6	7	8	9	ROW TOTALS
SHORT-TENURED	1	13	4	3	1	2	21	17	16	14	92
LONG-TENURED	2	19	1	0	0	4	4	7	17	30	84
COLUMN TOTALS	3	32	5	3	1	6	25	24	33	44	176

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
29.19684	9	.0006	.477	10 OF 20 (50 %)

Variable: LOSAVG

Description:
Average length of service--all jobs
0 = indicated #2 WORKEXP
1 = left blank/incomplete--can't determine
2 = < 6 months--some missing
3 = 6 months to 1 year--some missing
4 = 1 year to 2 years--some missing
5 = > 2 years--some missing
6 = < 6 months--all complete
7 = 6 months to 1 year--all complete
8 = 1 year to 2 years--all complete
9 = > 2 years--all complete

CROSSTABULATIONS: TENURE BY EMERGEN

	1	2	3	ROW TOTALS
SHORT-TENURED	0	0	2	2
LONG-TENURED	4	3	38	45
COLUMN TOTALS	4	3	40	47

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
.36556	2	.8330	.128	5 OF 6 (83.3%)

Variable: EMERGEN

Description:
Emergency contact
1 = left blank
2 = partial
3 = complete

CROSSTABULATIONS: TENURE BY EMPREF

	2	6	ROW TOTALS
SHORT-TENURED	25	36	61
LONG-TENURED	10	27	37
COLUMN TOTALS	35	63	98

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.39331	1	.2378	13.214	NONE

Variable: EMPREF

Description:
Use past employer as reference
1 = left CUREMP & CONTPRES blank
2 = not employed/no
3 = can't tell/no
4 = can't tell/yes
5 = yes/no
6 = yes/yes

APPENDIX C

CODING INSTRUCTIONS AND OUTPUT TABLES

SECOND RUN

Coding Instructions and
Second Run Chi-Square Test of Independence
Output Tables

CROSSTABULATIONS: TENURE BY REFERENCE SOURCE

	1	2	3	5	9	14	ROW TOTALS
SHORT-TENURED	18	32	4	27	0	2	83
LONG-TENURED	19	17	1	7	1	10	55
COLUMN TOTALS	37	49	5	34	71	12	138

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
19.64446	5	.0015	.399	5 OF 12 (41.7%)

Variable REFSORCE — Description: Source of referral

00 = not option for this application
01 = walk-in
02 = friend
03 = employment agency
02 = relative
05 = newspaper--source provided
05 = newspaper--source not provided
02 = employee--source provided
02 = employee--source not provided
09 = JTPA
02 = relative/friend
02 = friend/employee--source provided
02 = relative/employee--source provided
05 = newspaper/employee--source not provided
14 = left blank

CROSSTABULATIONS: TENURE BY CURRENTLY EMPLOYED

	1	2	3	4	ROW TOTALS
SHORT-TENURED	1	47	1	40	89
LONG-TENURED	3	25	16	39	83
COLUMN TOTALS	4	72	17	79	172

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
20.78617	3	.0001	1.930	2 OF 8 (25%)

Variable	Description
CUREMP	Currently employed 1 = left blank 2 = no 3 = can't tell 5 = yes

CROSSTABULATIONS: TENURE BY CONTACT CURRENT EMPLOYER

	1	2	3	5	ROW TOTALS
SHORT-TENURED	2	27	6	55	90
LONG-TENURED	10	14	3	38	65
COLUMN TOTALS	12	41	9	93	155

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
9.78511	3	.0205	3.774	1 OF 8 (12.5%)

Variable	Description
CONTPRES	Contact present employer 1 = left blank 2 = left blank--not currently employed 3 = no 5 = yes

CROSSTABULATIONS: TENURE BY COURSES STUDIED

	1	2	3	ROW TOTALS
SHORT-TENURED	43	16	29	88
LONG-TENURED	16	31	15	62
COLUMN TOTALS	59	47	44	150

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
17.62044	2	.0001	18.187	NONE

Variable	Description
CORSTUD	Courses studied 1 = left blank 2 = general 3 = listed specific area--not HC related 3 = listed specific area--HC related

CROSSTABULATIONS: TENURE BY DIPLOMA

	1	2	3	ROW TOTALS
SHORT-TENURED	49	6	32	87
LONG-TENURED	18	7	37	62
COLUMN TOTALS	67	13	69	149

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
10.89460	2	.0043	5.409	NONE

Variable	Description
DIPLOMA	Diploma listed 1 = left blank 2 = no 3 = only for highest degree earned 3 = all listed

CROSSTABULATIONS: TENURE BY LENGTH OF SERVICE

	1	5	ROW TOTALS
SHORT-TENURED	11	80	91
LONG-TENURED	23	60	83
COLUMN TOTALS	34	140	174

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
8.32830	1	.0803	16.218	NONE

Variable	Description
LOS	Length of service indicated 1 = left all blank 1 = incomplete 1 = 1/4 listed 1 = 1/3 listed 5 = 1/2 listed 5 = 2/3 listed 5 = 3/4 listed 5 = all complete

CROSSTABULATIONS: TENURE BY NUMEMP

	1	4	ROW TOTALS
SHORT-TENURED	3	88	91
LONG-TENURED	14	69	83
COLUMN TOTALS	17	157	174

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
8.32830	1	.0803	8.109	NONE

Variable	Description
NUMEMP	Number of complete/understandable employer names 1 = left blank/none understandable 1 = 1/4 complete/understandable 1 = 1/3 complete/understandable 4 = 1/2 complete/understandable 4 = 2/3 complete/understandable 4 = 3/4 complete/understandable 4 = all complete/understandable

CROSSTABULATIONS: TENURE BY NUMADD

	1	3	ROW TOTALS
SHORT-TENURED	20	73	91
LONG-TENURED	46	37	83
COLUMN TOTALS	66	108	174

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
4.98115	1	0	31.483	NONE

Variable	Description
NUMADD	Number of complete employer addresses (street, city, & state) 1 = left all blank 1 = some blank/some partial 3 = all partial 3 = all complete 3 = some complete/some partial 1 = some complete/some partial/some blank 1 = some complete/some blank

CROSSTABULATIONS: TENURE BY NUMWAGE

	0	4	ROW TOTALS
SHORT-TENURED	17	73	90
LONG-TENURED	34	40	74
COLUMN TOTALS	51	113	164

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
16.03047	1	.0068	23.012	NONE

Variable	Description
NUMWAGE	Number of wage rates listed 0 = left all blank 0 = all incomplete 0 = 1/4 listed 0 = 1/3 listed 4 = 1/2 listed 4 = 2/3 listed 4 = 3/4 listed 4 = all listed

CROSSTABULATIONS: TENURE BY NUMJTIT

	1	4	ROW TOTALS
SHORT-TENURED	11	74	85
LONG-TENURED	25	55	80
COLUMN TOTALS	36	129	165

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.94531	1	.7458	17.455	NONE

Variable	Description
NUMJTIT	Number of complete job titles 1 = left all blank 1 = 1/4 listed 1 = 1/3 listed 4 = 1/2 listed 4 = 2/3 listed 4 = 3/4 listed 4 = all listed

CROSSTABULATIONS: TENURE BY NUMRSN

	1	4	ROW TOTALS
SHORT-TENURED	10	81	91
LONG-TENURED	20	63	83
COLUMN TOTALS	30	144	174

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
1.94531	1	.7458	14.310	NONE

Variable	Description
NUMRSN	Number of complete reasons for leaving 1 = left all blank 1 = 1/4 listed 1 = 1/3 listed 4 = 1/2 listed 4 = 2/3 listed 4 = 3/4 listed 4 = all listed 4 = one job, still employed 4 = 4/5 listed

CROSSTABULATIONS: TENURE BY LOSLJOB

	1	2	4	ROW TOTALS
SHORT-TENURED	14	49	28	91
LONG-TENURED	21	21	40	82
COLUMN TOTALS	35	70	68	173

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
14.28811	2	.0008	16.590	NONE

Variable	Description
LOSLJOB	Length of service last job 1 = left blank/incomplete--can't determine 2 = < 6 months 2 = 6 months to 1 year 4 = 1 year to 2 years 4 = > 2 years

CROSSTABULATIONS: TENURE BY WRKRPT

	1	2	ROW TOTALS
SHORT-TENURED	39	52	91
LONG-TENURED	58	25	83
COLUMN TOTALS	97	77	174

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
11.77651	1	.0006	36.73	NONE

Variable:	Description:
WRKRPT	Completeness of work history 1 = LOS/NUMEMP/NUMADD/NUMPHON all complete 2 = anything else

CROSSTABULATIONS: TENURE BY LOSAVG

	1	6	7	ROW TOTALS
SHORT-TENURED	23	21	47	91
LONG-TENURED	24	4	54	82
COLUMN TOTALS	47	25	101	173

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
11.62969	2	.0008	16.590	NONE

Variable	Description
LOSAVG	Average length of service--all jobs
	1 = left blank/incomplete--can't determine
	1 = < 6 months--some missing
	1 = 6 months to 1 year--some missing
	1 = 1 year to 2 years--some missing
	1 = > 2 years--some missing
	6 = < 6 months--all complete
	7 = 6 months to 1 year--all complete
	7 = 1 year to 2 years--all complete
	7 = > 2 years--all complete

APPENDIX D

FINAL CODING INSTRUCTIONS

Final Coding Instructions
Nominal Code Labels

Variable	Description
REFSORCE	Source of referral 1 = newspaper/employee--source not provided 1 = newspaper--source provided 1 = newspaper--source not provided 2 = friend 2 = employment agency 2 = relative 2 = employee--source provided 2 = employee--source not provided 2 = JTPA 2 = relative/friend 2 = friend/employee--source provided 2 = relative/employee--source provided 3 = walk-in 4 = left blank
CUREMP	Currently employed 1 = no 2 = yes 3 = can't tell 3 = left blank
CONTPRES	Contact present employer 1 = left blank--not currently employed 2 = yes 3 = no 4 = left blank
CORSTUD	Courses studied 1 = left blank 2 = listed specific area--not HC related 2 = listed specific area--HC related 3 = general
DIPLOMA	Diploma listed 1 = no 2 = left blank 3 = only for highest degree earned 3 = all listed

Variable	Description
LOS	Length of service indicated 1 = 1/2 listed 1 = 2/3 listed 1 = 3/4 listed 1 = all complete 2 = left all blank 2 = incomplete 2 = 1/4 listed 2 = 1/3 listed
NUMEMP	Number of complete/understandable employer names 1 = 1/2 complete/understandable 1 = 2/3 complete/understandable 1 = 3/4 complete/understandable 1 = all complete/understandable 2 = left blank/none understandable 2 = 1/4 complete/understandable 2 = 1/3 complete/understandable
NUMADD	Number of complete employer addresses (street, city, & state) 1 = all partial 1 = all complete 1 = some complete/some partial 2 = left all blank 2 = some blank/some partial 2 = some complete/some partial/some blank 2 = some complete/some blank
NUMWAGE	Number of wage rates listed 1 = 1/2 listed 1 = 2/3 listed 1 = 3/4 listed 1 = all listed 2 = left all blank 2 = all incomplete 2 = 1/4 listed 2 = 1/3 listed
NUMJTIT	Number of complete job titles 1 = 1/2 listed 1 = 2/3 listed 1 = 3/4 listed 1 = all listed 2 = left all blank 2 = 1/4 listed 2 = 1/3 listed

Variable	Description
NUMRSN	Number of complete reasons for leaving 1 = 1/2 listed 1 = 2/3 listed 1 = 3/4 listed 1 = all listed 1 = one job, still employed 1 = 4/5 listed 2 = left all blank 2 = 1/4 listed 2 = 1/3 listed
LOSLJOB	Length of service last job 1 = < 6 months 1 = 6 months to 1 year 2 = 1 year to 2 years 2 = > 2 years 3 = left blank/incomplete--can't determine
LOSAVG	Average length of service--all jobs 1 = < 6 months--all complete 2 = left blank/incomplete--can't determine 2 = < 6 months--some missing 2 = 6 months to 1 year--some missing 2 = 1 year to 2 years--some missing 2 = > 2 years--some missing 3 = 6 months to 1 year--all complete 3 = 1 year to 2 years--all complete 3 = > 2 years--all complete
WRKRPT	Completeness of work history 1 = anything else 2 = LOS/NUMEMP/NUMADD/NUMPHON all complete

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