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THE SELECTION OF NURSES

A MULTIVARIATE STUDY

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ABSTRACT

Following a comprehensive review of nurse selection literature, data were obtained from four tests of personality (EPPS, WPAI, NSQ AND EPI) and one of mental ability (ACER) administered to 96 students selected for a hospital-based nurse training programme. Of the 96 students, 59 had completed two years of training and additional data were included from 37 new entrants. The scores from the variables were subjected to factor analysis and 13 factors specific to a nurse population were isolated. Satisfactory and unsatisfactory nurses were found to differ significantly on four factors. Discriminant analysis was carried out to investigate how well the factors could differentiate between the trainees who had completed two years of training satisfactorily and those who had not. Three of the four factors isolated by the factor analysis originated primarily from the EPPS with variables of anxiety from the NSQ and the EPI. The fourth factor was primarily that of conservatism. The results indicate that variables suggesting neurotic trends of personality, deference and conservatism are major factors among successful nurses.

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SECTION 1

INTRODUCTION

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1.10 Review of methods and findings in nurse selection:

Some criteria for the selection of applicants for nursing studies is necessary as there is much evidence to show that many student nurses withdraw before the first examination for state registration.

Suggested reasons for this high attrition rate have been extensively documented (Phillips, 1965; Scott-Wright, 1968; Klahn, 1969;

Carpenter, 1971; Brown and Stone, 1973; Birch, 1975; Green, 1977.

Reeve, 1978). Many reasons have been offered for this high attrition rate but no simple answer is forthcoming. One common approach has been to attempt to improve selection standards.

Initial attempts at personnel selection were based almost entirely on the evaluation of submitted biographical data and on the results of a subsequent interview undertaken by a member of the prospective employing agency. The mechanism of this selection paradigm was essentially the matching of an applicant's attributes with the task requirements of the organisation. This matching procedure generally took little regard of vocational variables, personality or attitudes of the prospective candidates. While this facet of personnel selection remains a central feature of modern selection methods, recent developments have placed a far greater emphasis on the organisational needs of the employing agency as well as on the evaluation of the traditional selection criteria. The historical developments of personnel selection have recently been summarised (Guion, 1976), while some of the major advances in personnel assessment and utilisation have also been reviewed (Dunette and Borman, 1979). More recently, a number of new interpretations and techniques (e.g. new attitude batteries and multivariate selection procedures) have been used within this traditional framework in an attempt to improve the selection of various occupational groups (Darlington, 1968, 1976;

Cole, 1973; Bouchard, 1976; Super, 1978). More specifically, attempts have been made to link intellectual, personality, biographical and other circumstantial data to predict more reliably the employment potential of prospective candidates. (Johnson and Leonard, 1970).

Within this latter framework, an attempt has been made in this thesis to demonstrate the utility of multivariate techniques, (i.e. factor analysis and discriminative analysis) to isolate new combinations of variables which will identify attributes of nurses and to determine whether or not such attributes can discriminate usefully between nurses who achieve success and those who are likely to fail or withdraw. Multivariate techniques are used to study selection because no one variable is likely to measure all the advantageous attributes of the successful nurse. For example, educational level is an essential criterion in nursing (King, 1969), but extensive utilisation of this factor has failed to reduce substantial attrition rates in New Zealand schools of nursing (Carpenter, 1971). It appears that intellectual factors are effective predictors of attrition but only within the first six to twelve months of training (Plapp, Psathas and Caputo, 1965). Other studies evaluating education criteria have yielded conflicting results, (Gerstein, 1965; Robinson, 1972; Green, 1977). Conflicting data also exist for the effectiveness of personality and attitudinal factors in predicting nurse attrition (Smith, 1965; Singh, 1970, 1972; Lewis and Cooper, 1976). Thus the identification of variables which are likely to predict the satisfactory performance of student nurses have, in the past, been restricted to the use of a single criterion or a combination of the traditional selection criteria. (Gerstein, 1965; Levitt, Lubin and de Witt, 1971; Robinson, 1972; see Lewis and Cooper 1976 for a recent review).

Some attempts have been made to utilise multivariate techniques to predict attrition rate, (Burton, 1972; Birch, 1975; Green, 1978) but few studies have utilised multivariate methods to generate factors unique to nurses and which subsequently serve to distinguish between satisfactory and unsatisfactory nursing behaviours. The absence of accepted reliable tests which forecast success in nursing implies that the traditional selection criteria have not generally been appropriate for nurse selection. This is because the selection of personnel for complex occupational and professional groups is difficult due to the diverse and specialised tasks which constitute the job. (Dunette, 1963; Guion, 1976). In any group of successful nurses a wide spectrum of relevant qualities may be displayed, though no two individuals are likely to have the same combinations. Hence a complete range of characteristics of the theoretically "ideal" candidate is unlikely to be shown by any one applicant. As selection cannot be predicted reliably by a few simple criteria, then multivariate techniques should be considered to permit the generation of unique factors by the assignment of various weightings to combinations of criteria which are difficult to calculate by conventional methods. Before evaluating multivariate selection criteria, the role of the interview and psychological testing in nurse selection is briefly reviewed.

1.11 Role of interviewing in nurse selection:

Historically the development of methods for the selection of nurses in New Zealand has followed a pattern similar to that observed in other occupations and other countries; that is, an application to a pre-selected training school and subsequent interview by a senior nursing officer. Experience has shown that while the interview is

the most widely used discriminating technique, it has limited reliability and validity (see Schmitt, 1976; Reeve, 1978; for recent reviews). Recently the interview as a procedure in selection of nursing students has been re-examined in an attempt to improve its reliability. The candidates style of interpersonal behaviour and the prospect of successful adjustment to social aspects of the job situation can, for example, be assessed; but more importantly, the motivational and vocational aspirations of the applicants can probably be evaluated more accurately by interview than by any other method (Argyle, 1967; Reeve, 1978). It is suggested that limitations derive from the employment of untrained interviewers who have made decisions based on self image, which has little relationship to the critical requirements of nursing.

1.12 Role of psychological testing in nurse selection:

The other major technique in the selection of nurse students has been psychological testing. As the nursing profession developed greater emphasis on written examinations, scholastic ability was found to be a reliable measure of success in final examinations for the State Registration (King, 1969; Robinson, 1972; Brown and Stone, 1973), but not of attrition (Green, 1977). High attrition rates from New Zealand nursing programmes have been reported for many years and it is well established that an average of 30 per cent of students will not achieve State Registration. The New Zealand Nursing Council recommendations for education requirements are set out in the Nurses' Regulations (1979) (see Appendix I). However, for the three year nursing programme most schools of nursing require a minimum of School Certificate as well as Sixth Form Certificate in four subjects.

The high attrition rate suggests that in this situation

intellectual factors are not decisive for the prediction of failure. Factors which may account for withdrawal include the lack of ability to accept responsibility (Cordiner, 1968), (see Section 3, Factors 2 and 4) and the unavoidable association with disease and death (Reaveley and Wilson, 1972), (see Section 3, Factors 2 and 11), joined with the complexity of nursing tasks creating a unique situation in which factors other than intellectual ones might lead to withdrawal. In this situation, knowledge of personality and attitudinal factors are important for selection decisions.

While the consensus has been that personality factors are important in the selection of personnel, empirical attempts to relate personality test scores to criteria of success in nurse training have met with limited success. In part, this is due to variations in the nursing sample, the different times throughout the programme when testing has been done and the different personality inventories used, (see Lewis and Cooper, 1976; for a recent review) while another restriction has been the use of univariate statistical designs, (Burton, 1972). Univariate designs are a weaker and less effective method for complex occupations than multivariate techniques because multivariate designs enable the establishment of unique combinations of criteria and weightings. For example, multiple regression analyses all the predictor variables simultaneously and selects the most effective combination (Clarke, 1977).

In the present study attention is given to nurse training programmes which have relevance for New Zealand, and in particular, to those studies which use multivariate statistical procedures. Relevant studies conducted in the United States of America and the United Kingdom, Australia and New Zealand are reviewed separately because of the substantial national differences in nursing programmes.

The aim of the review is to indicate the trend towards multivariate research on nurse selection in various countries and to indicate some of the limitations which exist in these data.

In the general trends of nursing research similarities with the New Zealand situation are apparent in spite of many differences which exist in curricula. Because of the present trend towards non-hospital based nursing education in New Zealand, the data obtained in the United States of America may become more relevant in New Zealand in the future.

1.20 Research in nurse selection in North America:

Because of the size of the United States, the differing ethnic groups and the variety and number of teaching programmes, there is a significant variation in nursing training within the country. Generally the programmes are unlike those in New Zealand as they are usually based in educational institutions and students do not have a simultaneous hospital service commitment. In the general trends of nursing research, however, similarities with the New Zealand situation are apparent.

Early studies in the United States attempted to relate scholastic ability to academic performance. It was evident that while an adequate intellectual level was required, success in nursing cannot be assessed solely by scholastic aptitude (Potts, 1941). Many criteria have been examined in an attempt to ascertain the relationship between nursing education and professional success. For example, emotional and social variables were important in differentiating between those who fail and those who complete the course, (Meadow, 1964), and this further emphasises the need for accurate and reliable instruments to permit assessment of the emotional adjustment of the

candidates. Batteries of tests including scholastic, vocational and personality measures have met with limited success, largely because they have been piecemeal and lacked sophistication (Johnson and Leonard, 1970; Burton, 1972).

Recent research in the United States has examined several predictive models of nursing turnover utilising demographic variables, job satisfaction variables (Newman, 1974), organisational context variables such as hospital size, location and compensation plans (Elnicki, 1975) and family context variables such as family size, income and home ownership (Bognanno, Hixon and Jeffers, 1974). In spite of the range of variables used no results were able to account for more than 10 per cent of the variance in nursing turnover. In a more comprehensive factorial study, 22 demographic, job satisfaction, organisational and family context variables yielded a result accounting for 56 per cent of the variance in nursing terminations (Price and Bluedorn, 1976). This finding provides further support for the contention that single factors are unlikely to make significant contributions to selection equations and that greater amounts of variance are more likely to be explained by conglomerates of many factors. The relationship between personality and scholastic success has been an area of continuing study, but empirical attempts to relate test scores to such success have been disappointing. A report of 300 studies summarised the available information concerning the relationship of personality and success:

"A number of investigations used a variety of personality and interest tests to predict success in schools of nursing with varying results. Occasionally a positive correlation was reported, but the preponderance of such tests showed no relationship." (Hill, Taylor and Stacey, 1963)

Others have identified minor trends, for example, the Edward's Personal Preference Schedule (EPPS) and Cattell's Sixteen Personality Factors Questionnaire (16 PF) was administered to 264 applicants as part of a pre-entrance battery. Comparisons were made between the scores of the 219 girls who completed the three year course and the 45 girls who failed using both univariate and multivariate statistical procedures for data analysis. Comparison with the unsuccessful nursing students showed that the more successful nurses were better adjusted, less preoccupied with sex and displayed more endurance and perseverance (see Section 3, Factors 1, 6 and 7). The results suggested that successful students were more conservative in their attitudes and more interested in achievement (Smith, 1965). A battery of tests using measures of scholastic ability, intelligence and personality was used in the Toronto Nursing School, 1967-1969. In this study it was found that personality variables were very important as successful students were more emotionally stable, showed greater self-reliance and were more conventional than those who withdrew from training (see Section 3, Factors 1, 6 and 7), while scholastic ability and intelligence (see Section 3, Factor 3), contributed to a small degree (Willett, Riffel, Breen and Dickson, 1971).

Generally, studies in the United States which have used personality tests as predictors of attrition have found small relationships between personality and attrition, (e.g. Butterfield and Warren, 1962). Recent trends encompass areas of socialisation, manpower planning, (Lum, 1979) performance appraisal (Kaelin and Bliss, 1979) and leadership selection (Plaszczynski, 1979), in attempts to apply more sophisticated analytical models to various problem areas in nursing. Attitudinal and personality characteristics of successful students have been compared with those who were rejected or did not complete

the course, and an attempt has been made to determine whether or not the characteristics of the students changed during the course of their training. These reports indicate that changes did occur which showed some learning of their new role but these did not persist beyond the training situation (Bruhn, Floyd and Bunce III, 1978). The implication of this study is that nursing educators need to be more realistic regarding the re-socialisation of nurses, for basic personality traits are relatively enduring and are not, to any extent, readily altered. The present interest in appraisal techniques should lead to more accurate job descriptions and the development of accurate selection criteria (Golightly, 1979).

Generally, the current trend for research in the United States is directed towards vocational attributes so that the student's role-perception is compatible with organisational goals (Schwirian and Gortner, 1979). While this approach has met with some success, the overall attrition rate in nursing does not appear to be reducing as predicted. In order to reduce this high attrition rate education and admission offices have been urged to re-examine and improve selection criteria and procedures (Weinstein, 1979).

1.21 Research on nurse selection in the United Kingdom:

In the past this research has necessarily differed from that in the United States of America because almost all English nursing programmes were hospital based. This implied that in addition to the prescribed study programme a practical component was added as the students worked in the hospital where they constituted a substantial proportion of the work force. In spite of this difference, the early studies followed a similar pattern of emphasis to that observed in the United States.

In a review of 16 studies a direct relationship between success in the preliminary examination, educational background and scores on the Otis test of intelligence was present (McGuire, 1969). Reports have shown that after the introductory course examination Intelligence Quotient (IQ) becomes an increasingly lower predictor of success (Crookes and French, 1961). It is of interest that a similar report from the United States suggested that intellectual factors can forecast success or failure reliably only during the first six months to one year after commencement of training (Plapp, Psathas and Caputo, 1965). (See section 1.20). Educational attainments or IQ as sole predictors of success have a limited place, for causes of wastage are varied and often include, besides educational factors, dislike of nursing, or hospital discipline, home sickness, health and marriage (Birch, 1975). As in the United States, attrition rates among students are high - 18 reports show wastage varying from 20 per cent to 80 per cent (Birch, 1975). In a major report on nursing based on information from 19,000 trainees, the General Nursing Council of England and Wales reported a 30 per cent withdrawal. While a basic intellectual level seems requisite it was concluded that this does not necessarily increase the likelihood of a student becoming a better nurse, nor does it increase the chances of passing final examinations, a finding which concurs with that of the United States. Other characteristics are important and it is suggested that temperament, attitudes and motives must be considered (Lewis and Cooper, 1976).

In an attempt to examine such a hypothesis a battery of 12 personality and intelligence tests was administered to 126 student nurses who had been in training for six months. The test scores were correlated with a rating score based on assessments made by

tutor, sister and matron on 18 subjective personality and intelligence tests. These results showed that examination near the end of the preliminary training course and measures of general intelligence did not correlate with tutor ratings. In contrast, personality scores were highly correlated with tutor ratings (Petrie and Powell, 1951). The results of this study suggest that personality factors may be more reliable predictors of success in nursing. Unfortunately, these findings are not conclusive because of the similarity of the criterion adopted by the senior nurses to those based on personality factors and because no data were presented to show associations between tutor ratings and the eventual outcome of training. A replication of this study with 159 students also failed to demonstrate the relationship between tutor ratings and the final examination (Lee, 1959). This study suggested, however, that ratings and examinations did NOT measure the same kind of "success" and therefore, personality factors were unlikely to predict either good ward performance or eventual examination success. (Lee, 1959).

More recent studies in the United Kingdom have shown significant differences in 11 personality and motivational factors when long-serving nurses were compared with student nurses. (Singh and McGuire, 1971). Other investigators have examined groupings of personality factors, (Reeve, 1978); vocational commitment, (Altschul, 1979); performance in clinical situations (Hockey, 1978) and realistic training criteria, (Clarke, 1977) as potential areas for reducing variance in nurse selection. Current United Kingdom research has demonstrated the need for accurate job analysis before assembling a battery of tests to assess nursing qualities and has emphasized the role of motivational and social aspects (Henley, 1980). At present the search for an "ideal" personality profile has not proved

successful and it is suggested that future research should be directed towards a constellation of personality factors, the presence or absence of which may show a relationship between competent and incompetent performance in nurse training (Reeve, 1978).

1.22 Research on nurse selection in Australia:

There are major differences in nursing programmes between the Australian states and uniformity does not always appear to exist among nursing schools within the same state. These facts may explain the small number of reported studies. Training for the most part has been similar to the hospital-based system developed in the United Kingdom with the students simultaneously engaged in hospital duties and theoretical programmes. As was reported in the United States and United Kingdom, a correlation has been found in Australia between scholastic standards and success in nursing, (Phillips, 1965). Personality as a major factor in nursing success does not appear to have been studied separately and the research has been directed toward greater understanding of the nurse's role in the organisational structure (Congalton, 1977). Generally Australian reports support those of the United States and the United Kingdom but with the added proviso that role-perception by the nurse appears to be an important factor and needs to be taken into account in personality research with nurses (Pryke and Harper, 1977).

1.23 Research on nurse selection in New Zealand:

High attrition or withdrawal from nursing training is an enduring problem which New Zealand has in common with the other countries reviewed. In New Zealand a withdrawal rate of 39 per cent from a three year programme has been reported (Carpenter, 1971). Comparable

examples are, United States 33 per cent withdrawal before completion of training period (Klahn, 1969); United Kingdom over 40 per cent (Scott-Wright, 1968) and a rate of over 39 per cent in a three year training programme in the London area (Brown and Stone, 1973); Australian figures report wastage of 37.2 per cent (Phillips, 1965).

High attrition poses a distinct problem for limited capacity programmes such as nursing because many schools of nursing in New Zealand have many more applicants than available positions. Thus the place occupied by a student unable or unwilling to complete the programme is necessarily denied to another applicant and hence there is a large scale wastage of both human and economic resources. The need to identify selection procedures capable of filtering out potential failures and identifying potential success is, therefore, a critical one.

New Zealand studies have tended to follow trends in other countries particularly the United Kingdom as early studies reported scholastic ability as a measure of success. Students who entered nursing school with a pass in the New Zealand School Certificate examination were less likely to resign from the training programme than those who had entered without the qualification. An inverse relationship was observed between years of secondary schooling and attrition rate (King, 1969). As in the other countries, personality factors as predictors of success in nursing have been found to have limited value. A comparison between 22 psychiatric nurses who withdrew before completing one year of training and 23 nurses who had completed two to three years of training showed no differences on the Eysenck Personality Inventory, the Progressive Matrices, (Raven, 1938) and the Kuder Vocational Record (Robinson, 1972). In a later study it was reported that replies by psychiatric nurse trainees to an anonymous

job dissatisfaction questionnaire indicated a discrepancy between theoretical role expectations and actual clinical experience. The resulting conflict between ideology and practice presumably accounted for a proportion of the 60 per cent attrition rate but a relevant data analysis was not conducted (Robinson, 1972).

In an attempt to devise criteria for discrimination between successful and unsuccessful students a new test, the Massey Role Inventory, was constructed and administered along with the Personal Orientation Inventory (POI) to 107 nurses in all three years of nursing training. The results were inconclusive (Bates, 1976). Other reports indicated trends in testing for personality variables. For example, a battery of personality and attitude inventories was administered to 75 student nurses in all three years of training. Performance ratings of the same nurses were obtained from ward reports on a five point scale ranging from "excellent" to "unsatisfactory". The profiles of the high ability student nurses were conservative, religious and dogmatic and less acceptant of aggression. (See Section 3, Factors 1 and 6). The students high on ward ratings were found to be the ones most likely to complete the course (Stewart and Liddell, 1975). A similar study noted that third year students were characterised more by a high need for power and influence, (see Section 3, Factors 1 and 6), rather than by a high need for achievement and service to others which characterised the first year nurse, (see Section 3, Factor 7). This report also described the third year student as unimaginative and rigid, (Hines, 1974), (see Section 3, Factor 6).

Another New Zealand study utilised predictor variables of socio-economic index, age, education and four attributes of personality evaluated through independent ward report and self report. It

was suggested that such predictive success as this investigation afforded was on the basis of age, number of years of education and ward report.

A theory of vocational commitment was investigated using a scale designed to measure "expressed commitment", or in other words, commitment towards nursing. No clear results were obtained but attention was drawn to two aspects of importance to selectors of nurse candidates. Firstly a surprising proportion of the subjects were reported as not highly committed to nursing. This suggested that students between ages of 17 to 19 years (the age when recruitment occurs) were still tentative in respect of career choice. A second point was that students often showed little or no knowledge of the realities of nursing and this suggests that role conflict and the clash of expectations must be broken down if retention rate is to be improved (Ramsay, 1978).

1.30 General conclusions:

Because students have ultimately to reach a scholastic standard which permits registration it was inevitable that examinations in nursing were considered essential. Moreover, since scholastic success can be forecast to a considerable degree by high school performance it was logical to predict that some emphasis should be placed on intellectual factors. Nevertheless published work has suggested that success in the clinical area and scholastic success do not correlate well and the complexity of the problem is apparent in that most nurse failures result from withdrawal and not examination failure. Experience suggests that withdrawal signifies dissatisfaction with either the teaching or nursing itself; perhaps both. Such dissatisfaction could stem from predominantly psychological factors or from sociological

ones. For example, the youth and immaturity of the students; the false image of nursing which is widespread and tends to conceal the fact that nursing is demanding work requiring patience and energy. Because apparently small mistakes can have potentially disastrous results (i.e. legal as well as human consequences), inexperienced students may feel stressed in these new areas of responsibility. The discipline inherent in nursing, shift work and the inevitable intrusion of rostered duties on social life may cause dissatisfaction to some. In all these areas personality factors are inevitably involved and since one nurse may cope satisfactorily with problems in one way while another copes quite adequately in other ways it seems likely that no simple profile of qualities will predict those who will find satisfaction in a complex demanding situation.

1.40 Aim of the present study:

In Palmerston North Hospital candidates for general nursing training are required to have obtained the New Zealand University Entrance examination or its equivalent. Since the number of candidates so qualified was greatly in excess of the available places in the classes some reliable means of selection was necessary. Because an improvement in the interviewing skills had not lowered the attrition rate significantly some additional method was sought. An examination of the reasons for withdrawal or failure suggested that variables of anxiety were involved.

Since the review of the literature suggests that no one personality, intelligence or educational profile will meet the need of every nursing situation it is suggested that there may be combinations of variables which are essential for satisfaction and success in nursing. Previous experience with the NSQ indicated that this would be a

useful starting point.

In the present study several questions are considered:

1. Can New Zealand nurses be accurately selected using traditional selection criteria?
2. Can factor analysis generate new factors which may simplify the identification of candidates likely to be satisfactory student nurses in New Zealand?
3. Can multivariate statistical methods differentiate satisfactory from unsatisfactory student nurses when the factors generated in (2) are utilised?

With these questions in mind a battery of tests previously shown to have had some value in nurse selection was chosen. Personality, intelligence and social attitudes were assessed by five tests. The first was the Edwards Personal Preference Schedule (Edwards, 1954). This test has had wide use as a research instrument in selection of nurse candidates and useful trends have been reported (Smith, 1965; Levitt, 1967; Lewis and Cooper, 1976). The second was the Wilson-Patterson Attitude Inventory (Wilson, 1975) which has been validated in its early form for a New Zealand population (Wilson, 1973). This test has been administered extensively in New Zealand and in particular it has been utilised in two recent New Zealand nursing studies (Green, 1977; Ramsay, 1978). A reason for the use of the third test, the Eysenck Personality Inventory (EPI) (Eysenck and Eysenck, 1964) was that previous New Zealand researchers had used the test in studies which attempted to separate leavers from those remaining in a trainee nurse programme (Robinson, 1972; Stewart and Liddell, 1975; Green, 1977). Other data suggest that the personality dimensions of the EPI are able to measure personality dimensions reliably over the period of 20 years since the concept was first developed (Eysenck and

Eysenck, 1963). Eysenck, (1971) reports that better predictions regarding scholastic success and failure can be obtained by adding personality tests to a battery of tests of intelligence, ability and scholastic achievement. The Neuroticism Scale Questionnaire (NSQ) (Cattell and Scheier, 1961) was included as it is a test designed to give a properly weighted total to six dimensions of neurotic trends and anxiety. It has previously been used in New Zealand in selection of nursing candidates and trainee pilots, (Shouksmith, 1977, unpublished report). The tests devised by the Australian Council for Education Research (Clark, 1959) were added as they tested specific aspects of mental ability. Verbal and numerical tests have a history of success in predicting scholastic achievement. Research has shown vocabulary to be one of the most efficient measures of verbal ability. Although not as effective in so many areas as tests of verbal ability, those tapping numerical ability have also been useful predictors even in fields which do not obviously require numerical ability (Willett, Riffel, Breen and Dickson, 1971). The speed and accuracy and simple arithmetic problems test the accuracy and speed of perception which could be factors in efficient nursing performance. These tests have been utilised both in Australia (Phillips, 1965) and in New Zealand research (Ramsay, 1978). Previously employed in "isolation" with moderate success, it was anticipated that their use in combination should yield more reliable indices of nurse selection. Where prediction has been an explicit goal the approach has tended to be through univariate statistics. That is, each variable is examined one at a time and treated as if it were a separate predictor (Johnson and Leonard, 1970).

The overall hypothesis is:

That satisfactory New Zealand nurses under training exhibit

specific traits as measured by a combination of variables from the NSQ, EPPS, WPAI, EPI and ACER tests of intelligence which differ significantly from unsatisfactory New Zealand nurses under training.

A subsidiary hypothesis is:

That the variables which discriminate between the satisfactory and the unsatisfactory nurses under training will group into factors derived mainly from the NSQ and the EPPS.

As the literature indicates, there are many inconsistencies between results of the various researchers. However, the most consistently reported findings are the neurotic tendencies of nursing students and the higher scores on deference and affiliation and lower scores on dominance. There is also a trend toward a conservative attitude. (Cordiner 1968; Hines, 1974; Cooper et al 1976; Ramsay 1978).

An attempt has been made in this thesis to ascertain whether the failure to obtain criteria for nurse selection has been due perhaps to the difficulty in isolating underlying traits. As has been noted earlier the literature generally indicates that no one test has successfully predicted nursing success. However the review also reveals similarities in results which could imply that a search for underlying factors from tests commonly used in nurse selection could yield useful results.

SECTION 2

METHOD

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2.10 Design of study:

Much nursing research has been concerned either with students at the commencement of training or with "stayers" (after one year, eighteen months, etc.). Less attention has been given to trainees completing the course and subsequent comparisons between satisfactory and unsatisfactory trainees. In other words, between those who complete and continue in nursing and those who do not. (Cooper, Lewis and Moores, 1976; Lewis, 1980).

For the purpose of this study, the commencement of the final year seemed an appropriate point at which to administer the test battery selected because time did not permit a longitudinal study covering a total training period of three years and three months. For this reason the subjects involved in the study had completed two years of training at the time of testing and from these trainees two categories were defined.

i. Satisfactory nurses:

A group of 45 students who had completed two years of training and were currently meeting the requirements of the nursing programme. These are:

a. Scholastic requirements:

They had obtained the requisite pass of 50 per cent or more in the examination at the completion of 12 weeks in Introductory School and subsequently a minimum of 50 per cent in each of the medical, surgical and psychiatric modules which had been included in the course in these two years.

b. Clinical requirements:

Routine reports concerning the trainees' competence in ward duties and their acquisition of clinical skills as well as their attitude to the practical aspects of nursing were made

by an independent assessor, usually the ward charge nurse, at the completion of eight weeks of duty in a particular area.

ii. Unsatisfactory nurses:

A group of 14 students who were similar in all aspects to the satisfactory group of nurses except that they were not performing satisfactorily, either scholastically and/or clinically at the time of testing.

a. Poor scholastic performance:

This was failure to obtain the requisite pass of 50 per cent on any one component of the course outlined above and was likely to be followed by forced withdrawal.

b. Poor clinical performance:

Unsatisfactory ward reports (taken over two successive assessments) and assessed as for the satisfactory group.

Both satisfactory and unsatisfactory nurses had commenced training between the ages of 17 and 18 years and at the time of data collection were between 19 and 20 years. All subjects in the sample were female and all had completed the New Zealand University Entrance Examination.

iii. New nurses:

Further data was obtained from a group of 37 new entrants as it has been found that basic personality traits are relatively enduring (Stewart, 1978) and such changes as do occur during nurse training have been found not to persist beyond the training period (Burton, Floyd and Bunce, 1978; Reeve, 1978). Selection in this group of 37 students who were in the first week of training was based on the same scholastic criteria as the other groups and a selection interview.

In this interview the judgement of the interviewer may have been based on self image, related to such aspects as appearance, manner, verbal fluency and expressed commitment to nursing.

All the subjects in this study were naive with regard to the tests.

2.20 Materials:

Five tests were used:

1. Edwards Personal Preference Schedule (EPPS) (Edwards, 1954).
2. Wilson-Patterson Attitude Inventory (WPAI), (Wilson, 1975).
3. Eysenck Personality Inventory (EPI), (Eysenck and Eysenck, 1964).
4. Neuroticism Scale Questionnaire (NSQ), (Cattell and Scheier, 1961).
5. Australian Council of Education Research (ACER), (Clarke, 1959).

- i. ACER higher test M.L. - verbal reasoning
- ii. ACER higher test M.Q. - numerical reasoning
- iii. ACER speed and accuracy

Part I Accuracy in checking

Part II Arithmetic tests

2.21 Edwards Personal Preference Schedule (EPPS), (Edwards, 1954):

This test was designed primarily as an instrument for research and counselling purposes to provide quick and convenient measures of a number of relatively independent NORMAL personality variables. The EPPS measures "perceived need" areas derived from Murray's manifest need system. It is an inventory of 225 forced choice, paired comparisons, designed to show the relative importance within the individual of 15 key needs/motives. The schedule is composed so as to minimise the natural tendency of subjects to choose socially

desirable responses. The scheme is set out below:

Scale Title	Description
1. Achievement ACH	The desire to succeed, to do a difficult job well, to do one's best.
2. Deference DEF	The need to defer to authority, to follow instructions and do what is expected, to conform to custom and let others make decisions.
3. Order ORD	The need to have things planned and organised, to keep things neat and orderly. To have things arranged so they run smoothly without change.
4. Exhibition EXH	The desire to have an audience, to have others notice and comment on one's appearances. To be the centre of attention.
5. Autonomy AUT	To be independent of others in making decisions. The need to feel free to follow one's wishes, to criticize authority and to defy convention.
6. Affiliation AFF	To be loyal to friends, to form strong attachments, to participate in friendly groups.
7. Intraception INT	The need to analyse the motives of oneself and others.
8. Succorance SUC	To seek the help and encouragement of others.

Scale Title	Description
9. Dominance DOM	To maintain one's point of view. To be a leader and to be regarded as a leader. To supervise and direct the actions of others.
10. Abasement ABA	The need to feel inferior, timid and guilty and to withdraw from unpleasant situations.
11. Nurturance NUR	The desire to encourage and help others.
12. Change CHA	The desire for new things, to meet new people, to experience novelty.
13. Endurance END	The need to persist at a task until it is completed.
14. Heterosexuality HET	The desire to please the opposite sex. To enjoy heterosexual activities.
15. Aggression AGG	The need to openly display anger and hostility.

In addition to the 15 personality variables considered above, the EPPS provides a measure of test consistency and a measure of profile stability.

2.22 Wilson-Patterson Attitude Inventory (WPAI) (Wilson, 1975):

This test has been widely used in a variety of occupational settings. (Wilson, 1975). The scales were identified by factor analysis. Two of these are orthogonal component factors (conservatism - liberalism) and (realism - idealism). The other four are oblique primary factors (militarism - punitiveness, antihedonism, ethnocentrism - intolerance, religion - puritanism).

Conservative	vs	Liberal
Resistant to change.		Liking and accepting change
Preference for existing institutions.		
Preference for traditional institutions.		
Moderate, cautious, conforming.		
Realism	vs	Idealism
Practical, selfish and expedient in attitudes and beliefs.		Attitudes derived from ideology or world view, be it moral, religious or political.
Compare Eysenck's toughminded.		Compare Eysenck's tenderminded.

The four oblique factors have self-explanatory labels. They are components of general conservatism and high scores on them will tend to make for high C-scores.

2.23 Eysenck Personality Inventory (Eysenck and Eysenck, 1964):

This inventory has three scales:

Extraversion Introversion Lie Scale

The factorial studies of extraversion and intraversion may be regarded as idealized and points of a continuum to which real people may approach to a greater or lesser degree:

Extraversion	Introversion
Sociable - enjoys parties	Quiet, retiring, likes books instead of people
Needs people to talk to	Reserved and distant
Impulsive	Plans ahead
Carefree, easygoing	Serious
Tends to be aggressive and lose his temper quickly	Keeps his feelings under close control
Unreliable	Reliable
Toughminded	Tenderminded

The lie scale was found to be a useful indication of those "faking good". Recently it has been suggested that it is an important personality variable in its own right. That rather than "faking", it is an indication, not necessarily an insightful one, of the person's own self concept (Dicken, 1959; Pryke and Harper, 1977).

2.24 Neuroticism Scale Questionnaire (NSQ) (Cattell and Scheier, 1961):

This inventory is an instrument for measuring neuroticism or "neurotic trend", and is suitable for normal and abnormal adults and adolescents. It is suggested that:

"Some degree of neurosis exists throughout the entire population, affecting real-life adjustment and effectiveness. Therefore, the problem of neuroses is not the exclusive province of the clinician, but has to be considered by any practitioner concerned with selection and success. It may be dramatically relevant for only about five per cent of the population, but it has some real relevance for the other 95 per cent as well."

(Cattell and Scheier, 1961, p.3)

The Neurotic-Associated Personality factors measured by the scale are:

1. Factor I
Overprotection; tenderminded,
cultured, protected, emotional
sensitivity (vs) Toughminded
2. Factor F
Depressiveness; inhibited,
sober, seriousness (vs) Happy-go-lucky cheerfulness
3. Factor E
Submissiveness, suggesti-
bility, dependence (vs) Dominance
4. Factor O)
Worry, guilt,)
proneess) (vs) Assured self-confidence
5. Factor Q4)
Ergic Tension)
(from frustration)) Anxiety (vs) Calm relaxation
6. Factor C)
Ego weakness or)
emotional immaturity))
and instability) (vs) Ego strength

The last three dimensions group together in a second-order factor of anxiety and the test provides only one separate subscore for these three dimensions - an anxiety score - which becomes the fourth component of the test.

2.25 Australian Council for Education Research:

M-L contains 36 items to be worked in 15 minutes; the main items are

analogies, classifications, proverbs and logical reasoning. M-Q also has 36 items consisting of number series, number matrices and arithmetical reasoning questions to be completed in 20 minutes. Speed and accuracy consists of 160 number checking items and 160 word checking items allowing five minutes per section for completion. The arithmetic test consists of 60 items of simple arithmetic again with a time limit.

These lists measure specific aspects of mental ability.

2.30 Procedure:

The three groups were separate and had no communication with each other. The tests were administered to each group in their own classroom over a period of two successive half days with 15 minute intervals between each test. The researcher supervised the administration of all tests. Before the administration of the tests, a description of the project was given and explanations were made, questions were answered and a general interest promoted. At the beginning of the testing session it was explained that confidentiality was assured and it was emphasized that training progress would in no way be affected by the tests and that the hospital administrators would not have access to the results. All subjects agreed to co-operate. Some difficulties arose with the Edwards Personal Preference Schedule because of the nature of the questions but with explanation all students completed the battery. Subjects were allocated code numbers to further prevent identification and testing commenced. At the conclusion of testing all data was prepared for computer analysis.

SECTION 3

RESULTS

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3.10 Descriptive statistics:

In the initial phase the scores on all 33 variables were examined. The scores on the variables of the NSQ, EPPS, WPAI, EPI and ACER tests were calculated for all classifications of nurses. The means and standard deviations are shown in Table 1.

Table 2 shows results of t-tests of differences between the means for the satisfactory and unsatisfactory groups for all 33 variables.

The following significant results are grouped according to the tests from which the variables are derived.

NSQ Variables 1 to 4:

Satisfactory nurses were shown to be more dependent ($t = 2.93$, $p < .01$) and more submissive ($t = 2.24$, $p < .05$) than unsatisfactory nurses.

EPPS Variables 5 to 20:

For satisfactory nurses deference was greater ($t = 1.94$, $p < .05$) and order ($t = 1.97$, $p < .05$) than unsatisfactory nurses. The satisfactory nurses were more autonomous ($t = 2.46$, $p < .05$) but more abasing ($t = 2.46$, $p < .05$), indicated a greater measure of endurance ($t = 2.44$, $p < .05$) and were higher on the measure of heterosexuality ($t = 2.70$, $p < .05$) than the unsatisfactory group.

WPAI Variables 21 to 26:

Satisfactory nurses scored higher on ethnocentrism ($t = 1.90$, $p < .05$) than unsatisfactory nurses.

ACER Variables 30 to 33:

Satisfactory nurses scored higher for verbal ability ($t = 3.54$, $p < .01$) than unsatisfactory nurses.

Among the new nurses it is anticipated that some will be found ultimately to be satisfactory and others will prove unsatisfactory.

TABLE 1 - Means and standard deviations for new,
satisfactory and unsatisfactory nurses

	Variables	New Nurse		Satisfactory		Unsatisfactory	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
1.	Sensitivity	11.54	2.38	11.26	2.36	11.78	2.51
2.	Dependence	7.89	2.48	8.48	3.06	5.64	3.07
3.	Submission	12.75	3.31	12.02	3.16	10.42	1.91
4.	Anxiety	9.70	3.12	10.97	2.84	9.14	3.75
5.	Achievement	11.54	4.06	10.17	3.53	11.85	3.25
6.	Deference	9.64	2.97	10.53	3.53	8.57	3.08
7.	Order	10.56	4.69	10.26	3.78	7.71	4.17
8.	Exhibition	12.13	3.21	12.80	4.45	14.78	3.86
9.	Autonomy	12.97	3.98	14.28	4.24	16.85	3.67
10.	Affiliation	16.13	3.71	16.02	4.05	15.92	3.26
11.	Intracception	16.05	4.92	14.53	3.42	16.21	5.45
12.	Succorance	14.24	4.02	11.97	4.24	12.35	4.55
13.	Dominance	8.27	3.74	10.93	3.85	12.07	4.14
14.	Abasement	14.67	4.75	14.91	4.95	11.28	4.58
15.	Nurturance	17.59	3.29	16.02	3.94	15.78	3.98
16.	Change	19.40	4.46	18.42	5.20	19.64	3.27
17.	Endurance	13.73	3.83	14.06	4.71	10.35	4.81

TABLE 1 (continued)

Variables		New Nurse		Satisfactory		Unsatisfactory	
18.	Heterosexuality	18.75	6.28	15.91	5.61	19.78	4.17
19.	Aggression	10.45	4.59	13.22	3.57	13.42	4.58
20.	Consistency	10.97	2.25	10.55	1.77	10.85	1.91
21.	Conservatism	38.29	9.10	41.26	10.34	38.21	8.50
22.	Realism	23.64	5.74	25.06	6.54	24.71	6.69
23.	Militarism	9.86	3.68	10.11	3.74	8.92	3.31
24.	Antihedonism	13.51	3.31	13.60	3.91	13.35	3.52
25.	Ethnocentrism	5.16	2.42	7.13	2.99	4.85	3.99
26.	Religion	11.13	4.27	10.80	3.97	10.71	3.89
27.	Neuroticism	13.27	4.20	14.40	4.07	13.57	4.32
28.	Extroversion	16.05	3.81	14.13	3.30	16.14	4.29
29.	Lie	1.48	1.19	1.33	1.02	0.92	0.99
30.	Check	79.21	20.96	91.53	15.21	81.71	18.61
31.	Arithmetic	25.29	10.69	25.88	11.38	30.00	13.04
32.	ML - Verbal reasoning	24.89	4.24	22.68	4.80	26.78	3.26
33.	MQ - Numerical reasoning	20.40	5.42	20.37	6.64	18.35	7.65

Variables one to four - NSQ
 five to twenty - EPPS
 twenty-one to twenty six - WPAI
 twenty-seven to twenty-nine - EPI
 thirty to thirty-three - ACER

TABLE 2

t values of means of satisfactory and unsatisfactory nurses shown in Table 1

<u>df - 57</u>		
	<u>Variables</u>	<u>t values</u>
1.	Sensitivity	0.6651
2.	Dependence	-2.9327 +
3.	Submission	-2.2458 *
4.	Anxiety	-1.6270
5.	Achievement	1.6050
6.	Deference	-1.9475 *
7.	Order	-1.9778 *
8.	Exhibition	1.5672
9.	Autonomy	2.1382 *
10.	Affiliation	-0.0917
11.	Intraception	1.0519
12.	Succorance	0.2686
13.	Dominance	0.8860
14.	Abasement	-2.4640 *
15.	Nurturance	-0.1915
16.	Change	1.0177
17.	Endurance	-2.4550 *
18.	Heterosexuality	2.7010 *
19.	Aggression	0.1450
20.	Consistency	0.5058
21.	Conservatism	-1.0792
22.	Realism	-0.1666
23.	Militarism	-1.1046
24.	Antihedonism	-0.2192
25.	Ethnocentrism	-1.9081 *
26.	Religion	-0.0729
27.	Neuroticism	-0.6166
28.	Extroversion	1.5586
29.	Lie	-1.3028
30.	Check	-1.7387
31.	Arithmetic	1.0292
32.	ML - Verbal	3.5403 +
33.	MQ - Numerical	-0.8610

+ significant at the 0.01 level of significance

* significant at the 0.05 level of significance

For the ten variables which show statistically significant differences between the satisfactory and unsatisfactory groups, the new nurses should therefore have mean values lying between the extremes of the other two groups. This was found to be true for six of the variables which were: deference, abasement, endurance, heterosexuality, ethnocentrism, ML-Verbal.

However, the new group is shown to have higher means on dependence and submission than the other two groups. This may have been due to unfamiliar surroundings and been reflected in the test answers.

The new group scored higher than both satisfactory and unsatisfactory on order. This may be due to the fact that they were for the most part school leavers and perhaps, therefore, more accepting of student status.

Finally, the new group scored lower on autonomy. This would be in accord with greater submissiveness and dependence. They were two years younger and had not been involved in the hospital environment at the time of testing.

The data was then analysed in two stages, factor analysis and discriminant analysis.

3.11 Factor analysis:

All subjects were included in the factor analysis - including the new nurse group - as it has been found that basic personality traits are relatively enduring and such changes as do occur during nurse training have been found not to persist beyond the period of training (Burton, Floyd and Bunce, 1978; Reeve, 1978).

In addition all were self selected to the extent that they had applied for nursing training, all held the University Entrance

examination and all were aged 17 to 18 years at the time of commencing nurse training.

Factor analysis is a method for reducing a large number of variables into a smaller number of presumed underlying unities called factors. Factors are usually derived from the inter-correlations among a number of variables and are therefore theoretical constructs which reflect the variances shared by variables (Gorsuch, 1974; Gorsuch and Dreger, 1979). Factor analysis is utilised in this thesis as a method not only for reducing the number of variables but also for discovering underlying relations between the variables and because it yields factor scores which can be used in subsequent multivariate analysis (see Kerlinger and Pedhauzer, 1973).

Intercorrelations between the subscores for the 33 variables were computed using Pearson's product moment correlation coefficients. The intercorrelations between the subscores were then further analysed employing the principle axis method of factor analysis (Nie, Hull, Jenkins, Steinbrenner and Brent, 1975; Gorsuch and Dreger, 1979). The total scores for each of the tests were not included in these analyses as they are composite scores derived from other subscores (Child, 1970, p.39). The number of factors to be extracted was determined using the criterion of eigen value equal to or greater than one as the minimum acceptable value for inclusion of a factor, (Kaiser, 1960; Guttman, 1965; Gorsuch and Dreger, 1979). Thirteen factors were isolated under the criterion and were retained for varimax rotation (Kaiser, 1960; Nie, et al, 1975; Gorsuch and Dreger, 1979). The arbitrary criterion of ± 0.30 was set for a factor loading to be significant (Child 1970; Gorsuch, 1974). The thirteen factors are presented in the order of the percentage of the variance for which each accounts.

TABLE 3
 Percentage of the variance accounted
 for by individual factors

n = 96

	<u>Factors</u>	<u>Percentage of Variance</u>
Factor 1	Conservatism - Idealism	12.4%
2	Deference - Submissiveness	8.0%
3	Mental Ability	7.1%
4	Affiliation - Nurturance	6.8%
5	Abasement	6.2%
6	Militarism	5.5%
7	Achievement	4.8%
8	Extroversion	4.6%
9	Neuroticism	3.8%
10	Perceived Self-concept	3.8%
11	Sensitivity	3.6%
12	Perceptual Accuracy	3.4%
13	Heterosexuality	3.1%
Total percentage of the variance described		73.1%

Although the percentage of variance explained by any one factor is not large the total percentage explained by the first 13 factors is 73.1%. This is in line with recommendations from Green and Tull who suggest that a percentage between 70 and 80 per cent of the total variability in the original data should be retained, (Green and Tull, 1978). The high number of retained factors supports the contention that there are many aspects of personality traits. The relatively low percentage explained by each factor indicates that none of them predominates in the overall description.

Each of the 13 factors is discussed. Only those variables with a loading factor $\geq .30$ are included in the discussion, (Child, 1970; Gorsuch, 1974). The full matrix of loading factors is given in Appendix II. The 13 factors are presented in the order of the percentage of the variance for which each accounts and cross-referenced to the literature where appropriate.

Factor 1 - Conservatism-Idealism:

Conservatism	0.78
Realism	- 0.73
Antihedonism	0.85
Religion	0.71

This factor is primarily that of conservatism. The four variables are from the WPAI and indicate a preference for the existing and traditional institutions and suggest a person somewhat intolerant of change and fearful of risk taking. There is an element of idealism within traditional limits with overtones of self-denial (cf Eysenck's tender-mindedness). The variable "religion" is an extension of the conservative idealism picture and this has previously been reported (Stewart and Liddell, 1975). This conservatism and idealism correlates with the adoption of behaviour that is socially acceptable (Hartley and Holt, 1978). Conservatism has been reported by many researchers in nurse selection (Smith, 1965; Cooper, Lewis and Moores, 1976; Ramsay, 1978).

Factor 2 - Deference-Submissiveness:

Depression	0.36
Submission	0.75
Deference	0.68
Order	0.60
Autonomy	- 0.57
Dominance	- 0.38
Aggression	- 0.37

This factor is primarily one of neurotic trend (NSQ) with motivational aspects (EPPS) which support this. This person is fearful of acting independently, has a need to get suggestions from others, to follow instructions, do what is expected. The variable "submissive" is associated consistently with educational success (Cattell and Scheier,

1961). Such a person will function best in a supportive group where there is not excessive stress from unexpected change. Similar profiles have been reported (Smith, 1965; Cordiner and Hall, 1968).

Factor 3 - Mental Ability:

Arithmetic	0.63
ML	0.65
MQ	0.80

This factor is primarily one of mental ability. Both linguistic and numerical or quantitative problems are represented in these variables. In a study of Australian student nurses it was claimed that the tests from which these variables derive discriminated between successful and unsuccessful nurses, (Phillips, 1965). Some investigators suggest that intelligence and scholastic ability are predictors of success in nursing (King, 1969; Green, 1977), while others suggest that tests of intelligence become of less value after the first year (Plapp, Psathas and Caputo, 1965).

Factor 4 - Affiliation-Nurturance:

Affiliation	0.77
Succorance	0.49
Dominance	- 0.33
Nurturance	0.68
Endurance	- 0.32
Extraversion	0.36

This factor is primarily affiliation and nurturance. The variables with one exception derive from the EPPS. A person who would have a need to please, to do things with others rather than alone and to help those less fortunate. Because there is little urge to dominate and a tendency to look to others for help this student may function comfortably in a group. This person's perceived ideal is to care for and

help others but there may be some difficulty in conforming to a somewhat rigid discipline and any criticism offered may act adversely.

A similar profile was described by Levitt, 1967.

Factor 5 - Abasement:

Abasement	0.75
Change	- 0.36
Aggression	0.47
Neuroticism	0.45
Extraversion	- 0.31

This factor is primarily abasement. A person who has a feeling of inferiority, of timidity or guilt and a tendency to be fearful of unpleasant situations. Because this is accompanied by a degree of anxiety and a tendency toward aggression such a person may attempt to counteract fears by positive action. Trends such as these are to be found in personality types who tend to be more aware than the average of "atmosphere", audience-reaction and of the feelings and opinions of others (Pollitt, 1977). A degree of anxiety can be a positive feature prompting action (Eysenck, 1971). Abasement was a feature of the profile described by Levitt, 1967.

Factor 6 - Militarism:

Dominance	- 0.44
Conservatism	0.47
Realism	0.40
Militarism	0.79

This factor is primarily militarism. Three of the four variables are from the WPAI and all are aspects of an attitude of conservatism. A person delineated by this factor has a punctilious regard for rules and regulations, is realistic, probably unimaginative, controlled and persistent. Such findings for successful nurses have previously been reported. (Hines, 1974; Birch, 1975)

Factor 7 - Achievement:

Depression	0.40
Achievement	0.81
Order	0.36
Succorance	0.36
Change	- 0.58
Aggression	- 0.38
Extraversion	- 0.38

This factor is primarily achievement. Four of the five variables are from the EPPS. There is the suggestion in this factor of a person determined to succeed but to some extent unsure and requiring encouragement from others as self-concept is not well established. A similar profile was reported amongst a group of British students in the first weeks of training (Singh, 1971).

Factor 8 - Exhibition:

Depression	- 0.31
Exhibition	0.71
Intracception	- 0.64
Arithmetic	- 0.30

This factor is primarily exhibition. An expressive, sociable, talkative (perhaps too much so), adaptable, impulsive, clever person. Often, however, the cleverness is only superficial - impressive more for quickness than its depth. At times this person may seem too impulsive, embarking on a course of action with such haste that the task may need to be done again. With more prudence perhaps it would have been better not done at all. Such a profile may indicate poorer academic achievement (Eysenck, 1971).

In general such a person makes an excellent first impression which may not survive further critical consideration.

Factor 9 - Neuroticism:

Anxiety	0.58
Succorance	0.32
Consistency	- 0.76
Neuroticism	0.64

This factor is primarily neuroticism. This indicates a reserved, serious person, tender-minded, fastidious and rather anxious. There may be a tendency to act on the basis of intuition. A somewhat tense person in need of support, (Singh, 1971).

Factor 10 - Perceived Self Concept:

Depression	0.41
Ethnocentrism	0.60
Lie	0.81

This factor is primarily perceived self-concept. The person described here is possibly responding in terms of an ideal self-concept rather than actual self and an image of an idealised nurse may be what is projected. The clash between theoretical role expectations and actual clinical expectations is a factor frequently reported (Robinson, 1972; Ramsay, 1978).

It is suggested that Lie scoring in itself is a personality variable rather than an extraneous variable to be eliminated (Kline, 1967; Pryke and Harper, 1977).

Factor 11 - Sensitivity:

Sensitivity	0.81
Endurance	- 0.41
Ethnocentrism	- 0.32

This factor is primarily sensitivity. A neurotic trend which is an aspect of anxiety. The person depicted by this factor would exhibit traits of kindness and gentleness and be idealistic. A similar

finding was reported in successful students (Cordiner, 1968).

Conversely such students as this profile suggests may have difficulty in making judgements about others different from themselves and may find increasing responsibility an intolerable burden. (Mitchell, 1974; Johnson and Stinson, 1975; Frankenhauser, 1979).

Factor 12 - Perceptual Accuracy:

Extraversion	- 0.36
Check	0.82
Arithmetic	0.32
ML	- 0.40

This factor is primarily perceptual accuracy. ACER speed and accuracy test assesses a person's capacity to carry out rapid and accurate checking of lists of numbers and names. It is a narrow but important aspect of intelligence considered of importance to the work of a nurse (Phillips, 1965).

Factor 13 - Heterosexuality:

Change	0.33
Endurance	- 0.46
Heterosexuality	0.79
Consistency	0.34

This factor is primarily heterosexuality. This person is sociable, enjoying change and novelty. Possibly disinclined to endure the constraints of nursing, with its inevitable rostering of duties, increasing responsibility and adherence to rules. It has been found that relative to unsuccessful nursing students the successful ones were better adjusted, less preoccupied with sex and more interested in enduring and persevering (Smith, 1965).

Means, standard deviations and t tests were calculated for the 13 factors. Factors 4, 6, 7 and 9 were significant at the .05 level. These results are shown in Table 4.

TABLE 4

Means and standard deviations and t-tests of
satisfactory and unsatisfactory nurses

	Satisfactory (n = 45)		Unsatisfactory (n = 14)		t-tests df 57
	Means	Standard Deviations	Means	Standard Deviations	
Factor 1	.01	1.04	-.02	0.97	0.09
2	.09	0.87	-.39	1.18	1.67
3	.16	0.83	-.04	0.98	0.71
4	.07	1.02	-.62	0.93	2.25 *
5	-.00	1.11	.18	0.92	0.18
6	.17	0.95	-.53	1.17	2.26 *
7	.36	0.86	-.22	1.01	2.12 *
8	.16	0.96	.05	1.15	1.13
9	.30	0.83	-.38	0.94	2.58 *
10	-.10	0.93	-.22	0.79	0.46
11	-.15	1.09	-.21	0.86	0.19
12	-.15	1.03	.28	0.92	1.40
13	-.20	0.98	.33	0.76	1.88

* Significant at the 0.05 level of significance using a t-test.

Factor 4 - Affiliation-Nurturance:

The satisfactory trainees have a greater need to be with others and a desire to care for others more than those of the unsatisfactory group.

Factor 6 - Militarism:

This factor is one of various aspects of conservatism and is a feature of the satisfactory trainees but not of the unsatisfactory ones.

Factor 7 - Achievement:

The satisfactory trainees are higher achieving and are more orderly than the unsatisfactory trainees.

Factor 9 - Neuroticism:

The satisfactory nurses are more anxious than the unsatisfactory ones.

Other research has demonstrated similar aspects of personality to have been important for the satisfactory nurse. (Levitt, 1967; Cordiner, 1968; Bailey and Claus, 1969; Cooper et al, 1976; Lewis and Cooper, 1976; Green, 1977; Ramsay, 1978; Lewis, 1980; Hines, 1974).

3.12 Discriminant Analysis function:

The factor analysis has shown that there is a significant difference in personality profile between satisfactory and unsatisfactory nurses.

It is of interest to know how this information may be utilised. One must consider whether the nurses can be classified reliably with regard to a satisfactory/unsatisfactory outcome. This problem is addressed by using the 13 factors demonstrated in the factor analysis in a stepwise discriminant analysis which was undertaken to see how effectively the group membership could be predicted.

The order of the factors entered into the analysis was not predirected and any particular factor could be selected and retained if it gave an improvement in the discriminating power of the resultant discriminant function. This procedure ensured that the factors most likely to discriminate between the groups were not biased by a priori considerations. The significance of the difference between the groups was tested from the Generalised Mahalanobis D^2 .

As expected from the univariate results in Table 4 the multivariate discriminant analysis revealed a discriminant function which was clearly able to classify the nurses ($F(7, 51) = 4.59, p = 0.0005$). The standardised discriminant function is presented in Table 5.

TABLE 5

The standardised discriminant coefficients

Factor	2	4	6	7
Weight	0.427	0.289	0.447	0.501
Factor	9	12		13
Weight	0.589	-0.273		-0.349

The standardised discriminant function coefficients, ignoring their sign, represent the relative contribution of the associated variable to the function. Factors 2, 6, 7 and 9 make similar contributions to the function - no one variable ("factor x") dominates in discriminating power. The centroid values (unsatisfactory nurses, -1.40; satisfactory nurses 0.44) indicated that overall satisfactory nurses score higher than unsatisfactory nurses on this function.

TABLE 6

Group measurement of satisfactory and unsatisfactory nurses

		<u>Predicted group membership</u>	
		Satisfactory	Unsatisfactory
Actual Group Membership	{ Satisfactory	39	6
	{	86.7%	13.3% N = 45
	{ Unsatisfactory	2	12
	{	14.3%	85.7% N = 14

Per cent of grouped cases correctly classified = 86.4%.

In Table 6 nurses are assigned to a group membership matrix, on the basis of the highest probability of group membership as determined by the discriminant analysis. The classification of nurses into categories was achieved with 86.4% accuracy.

Of the 13.6% misclassified, two of the 14 ultimately

unsatisfactory students were "predicted" to be satisfactory and six of the 45 ultimately satisfactory nurses were "predicted" to be unsatisfactory.

While a correct classification of 86.4% is good, a word of caution is appropriate. Six of the satisfactory group were misclassified - that is they would ultimately have been satisfactory. More importantly two of the unsatisfactory group were incorrectly classified as satisfactory.

Further research into testing at different intervals could assist in refining the classification. If the aim of predicting satisfactory and unsatisfactory trainees is to be considered as part of a possible selection procedure, greater accuracy would certainly be necessary.

SECTION 4

DISCUSSION

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4.10 General Discussion:

In New Zealand as in other countries, there is an unacceptably high proportion of failures among nursing students. This wastage may in part be due to examination failure, though there is ample evidence in the literature that educational criteria and scholastic achievement are not accurate predictors of the satisfactory candidate who will complete the prescribed course and remain in nursing (Section 1). As a result research has turned to the area of personality and it was thought that the results of well-established personality tests could, perhaps, reveal an underlying personality profile in successful nurses if these were subject to multivariate procedures (Section 1).

The data obtained in the present study showed that, in the group under investigation, satisfactory nurses at an advanced stage of their training possessed personality profiles which differed from those who were unsatisfactory. The hypothesis that satisfactory New Zealand nurses while in training exhibit specific traits (as measured by the NSQ, WPAI, EPI and ACER tests) which differ significantly from unsatisfactory nurses is supported.

Accepting the relative invariance of personality traits it is suggested that this work although done at an advanced stage of training may still be used as a useful indication for selection of the type of person who would be successful in nursing.

The significant factors identified in this study indicated that satisfactory nurses differed from unsatisfactory nurses in that they had a higher level of anxiety, were more conservative and had a need to achieve. The satisfactory group were found also to have a desire to care for others, a need for loyalty and for participation in groups not demonstrated in their unsatisfactory counterparts, though there

is no conclusive evidence in the literature that any one profile reveals an adequate description of the characteristics required for a successful nurse, examination of the literature does show similarities which appear to be common to most studies and were demonstrated in the present investigation (Section 1). Satisfactory nurses were shown to be more achieving and more conservative than those who were unsatisfactory. Less clearly indicated in other work is the higher anxiety and need for loyalty and group participation that was exhibited by the satisfactory group and not evidenced to any extent by the unsatisfactory group.

Discriminant analysis was undertaken to determine how well these factors could classify nurse trainees as satisfactory or unsatisfactory. This was achieved to the extent that 86.4 per cent were correctly classified. While the discriminant function was capable of differentiating the two groups of nurses, a word of caution on the generalisation of results is appropriate. This is because the procedure of utilising factor scores as independent variables in the discriminant function places a number of restrictions on the interpretation of the results (Kukuk and Baty, 1979).

There is likely to be a loss of predictive efficiency when factor scores are used as predictors and as a result the technique may eliminate variables which could be significant predictors in the discriminant function.

Ideally, there should be few, if any, misclassifications. In this sample the best that could possibly be done nevertheless yielded an unacceptably high proportion of misclassifications. Of the 45 trainees in the satisfactory group six (13.3 per cent) were misclassified. If this profile were to be used for selection, then 13.3 per cent of the students who were successful would be

excluded from the programme. Conversely two (14.3 per cent) of the 14 unsatisfactory nurses would be taking the place of applicants likely to be successful. These discrepancies are unlikely to encourage employing authorities to adopt such forms of selection. Further work directed towards refining the profile seems essential if this type of testing is to become an accepted part of the selection procedure.

It will be recalled that this study was made because of the belief that satisfactory nurses in training differed significantly from their unsatisfactory colleagues. A subsidiary hypothesis was that the differences might be shown mainly in factors derived from the NSQ and EPPS. The NSQ is a short test measuring dimensions of anxiety and appears as part of the comprehensive personality test, the 16 Personality Factor Questionnaire (Cattell, Eber and Tatusoka, 1970). The EPPS measures "perceived needs" from Murray's manifest need system (Edwards, 1954). Three of the four factors, (Factors 4, 7 and 9 - Section 3) which differed significantly between the satisfactory and unsatisfactory trainees derived primarily from the EPPS and contained aspects of anxiety and neuroticism which were variables from the NSQ and EPI. The EPI is a measure of Introversion-Extroversion and may be regarded as idealised end points on a continuum to which real people may approach to a greater or lesser degree (Eysenck and Eysenck, 1964). Factor 6 was primarily that of conservatism from the WPAI. Thus the subsidiary hypothesis was only partially supported. The aspect of conservatism which appears so consistently in the literature (Section 1) would not have been shown if the NSQ and EPPS had been the only tests used.

Some studies have sought not only to discover criteria which will allow selectors to find which students will complete the period

of training but also to show a continuing commitment to nursing (Cooper, Lewis and Moores, 1976; Lewis 1980). With candidates aged 17 to 19 years this may be attempting more than is realistic. Because the production of an academic thesis imposes a time limit a more modest aim was unavoidable in the present study. However because it was the last section of training and since enough time has elapsed, it is interesting to follow the careers of the 14 trainees classified as unsatisfactory at the end of two years of training despite the fact that the information gathered is subjective and not rigorous. Using the same criteria, thirteen of the group of 14 unsatisfactory trainees had either withdrawn or were still not eligible for registration six months after the end of the third year. The reasons given were varied. Two withdrew from the course as it did not offer the academic challenge they required and practical nursing care "was not for them". Other reasons were "needing more freedom for social life", "do not like the hospital system", "nursing is not for me". Attitudes such as these if they did not lead to voluntary withdrawal, tended to result in examination failure due to lack of motivation. This suggests that what is involved is the question of personality traits which have been revealed over the two years of training and are capable at that time of being accurately assessed by nurse tutors. It is clear therefore that scholastic ability alone has little to do with success and satisfaction in nursing as a career.

4.11 Conclusion:

To find those nurse trainees who will be satisfactory and remain in nursing is difficult and the value of seeking some ideal personality profile for successful nurses may be questioned. Perhaps it would be more realistic to look for "constellations of factors" which are

present in successful nurses (Reeve, 1978). This investigation, covering as it does only the last segment of training, could be seen as a pilot study for further investigation into such constellations of factors which will be useful in the prediction of those applicants who will be satisfactory nurse trainees.

From the wide battery of tests used in this study four factors were identified as significant in isolating personality traits which in nurse trainees who were successful were different from those who were not. Three of the factors 4, 7 and 9 (Section 3) derived from variables contained primarily in the EPPS with variables from the NSQ and EPI. It is noted that these variables have been found to correlate significantly with factors in the 16 Personality factor questionnaire, (Cattell and Dreger, 1977). This personality inventory also contains a measure which reflects the continuum conservatism to radicalism which may equate with Factor 6 (Section 3). In addition some of the findings in the present study are similar to those reported by other investigators who have used the 16 PF (Cooper, Lewis and Moores, 1976; Lewis, 1980). It is suggested that for the future a longitudinal study should be made taking students from the commencement to the completion of training, and perhaps one year after to ascertain if they remain in nursing.

In such a study the instrument of choice should be the 16 Personality factor questionnaire Form C (Cattell, Eber and Tatusoka, 1970), because not only were the findings from this test in accord with other tests used in this study but it is one of the most comprehensive and widely validated of the available personality inventories. It should be noted that while this inventory has been used extensively in previous nursing studies (Lewis and Cooper, 1976) it has not been used on a nursing population in New Zealand. Form C which is

self-administering and comprises 105 three-alternative-choice items needs approximately 40 minutes to administer. This would be readily acceptable to administrators and trainees alike rather than the more cumbersome and time-consuming battery of tests used in this study.

In the current practice, there is no adequate job description to help in selecting appropriate trainees and if selection of candidates for nursing is to be more successful it would seem necessary that interviewers should receive adequate training and a realistic job analysis be provided. In this situation personality testing could provide valuable help.

SECTION 5

APPENDICES

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APPENDIX IMinimum educational qualifications:

1. No person who is not a registered nurse shall be accepted by the governing body of an institution specified in the First Schedule to these regulations or by the governing body of a school of nursing, as the case may require, as a comprehensive nursing student, a general and obstetric nursing student, a psychiatric nursing student, or a psychopaedic nursing student, unless the person:
 - a. Has obtained in the examination for School Certificate (whether at one attempt or in the course of more than one attempt), not less than 30 per cent of the total possible marks in English; and
 - i. Not less than 50 per cent of the total possible marks in each of three subjects, and not less than 180 marks in the aggregate in respect of those three subjects and, if necessary, one further subject; or
 - ii. Not less than 50 per cent of the total possible marks in each of two subjects, and not less than 40 per cent of the total possible marks in each of two further subjects; or
 - iii. Not less than 225 marks in the aggregate in respect of any number of subjects, not exceeding 5:
Provided that for the purposes of subparagraphs (i) and (ii) of this paragraph, Grade 7 in a Sixth Form Certificate shall be deemed to be the equivalent of a 50 per cent pass in a School Certificate subject; or
 - b. Is an enrolled nurse, or has attained the age of 20, and satisfies the governing body of the institution specified

in the First Schedule to these regulations or the governing body of the school of nursing, as the case may require, that the person is fit to undertake the course in comprehensive nursing or the nursing programme that the person seeks to pursue.

2. Nothing in this regulation shall compel the governing body of an institution specified in the First Schedule to these regulations or the governing body of a school of nursing to accept any person as a student.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
	Conservatism Idealism	Deference Submissiveness	Mental Ability	Affiliation Nurturance	Abasement	Militarism	Achievement	Exhibition	Neuroticism	Perceived Self-concept	Sensitivity	Perceptual Accuracy	Hetero- sexuality
Sensitivity	0.05	-0.02	-0.01	0.04	0.01	-0.02	-0.05	-0.01	-0.09	0.01	0.81	-0.18	0.14
Depression	0.14	0.36	0.12	-0.13	0.05	-0.09	0.40	-0.31	0.11	0.41	-0.02	0.14	0.00
Submission	0.02	0.75	-0.06	0.03	0.00	0.16	-0.06	-0.08	0.09	0.06	0.15	0.13	0.03
Anxiety	0.22	0.05	-0.22	-0.13	0.11	0.14	0.07	-0.25	0.58	0.13	-0.27	0.02	0.07
Achievement	0.02	-0.14	-0.01	-0.14	-0.11	-0.05	0.81	-0.00	-0.03	-0.11	-0.06	-0.12	-0.01
Deference	0.10	0.68	0.05	-0.10	-0.06	-0.03	-0.10	-0.01	-0.04	-0.16	-0.29	-0.10	-0.09
Order	0.01	0.60	-0.09	-0.12	0.10	0.12	0.36	0.16	0.05	0.05	0.16	0.26	-0.14
Exhibition	0.04	-0.24	0.01	-0.10	-0.20	0.00	0.01	0.71	-0.12	0.11	0.18	-0.06	0.00
Autonomy	-0.27	-0.57	-0.08	-0.22	-0.23	0.18	0.01	0.12	-0.02	-0.06	0.27	0.17	0.03
Affiliation	-0.02	0.07	0.08	0.77	-0.16	-0.14	-0.03	-0.04	-0.04	-0.09	-0.02	0.03	-0.10
Intracception	-0.00	-0.11	0.01	0.00	-0.10	-0.03	-0.03	-0.64	-0.20	0.11	0.22	-0.12	-0.20
Succorance	0.05	0.15	0.13	0.49	-0.05	0.07	0.36	0.19	0.32	0.16	0.08	-0.29	0.21
Dominance	0.28	-0.38	0.23	-0.33	0.10	-0.44	-0.05	0.21	0.11	-0.13	0.15	-0.19	-0.09
Abasement	0.02	0.12	-0.12	0.03	0.75	0.19	0.01	-0.11	0.05	0.05	-0.05	-0.01	-0.05
Nurturance	0.16	-0.12	-0.04	0.68	0.27	0.02	-0.10	-0.09	-0.02	0.03	0.13	-0.01	0.05
Change	0.01	-0.07	-0.15	-0.25	-0.36	-0.00	-0.58	-0.20	-0.03	0.22	0.04	0.03	0.33
Endurance	0.00	0.15	-0.00	-0.32	-0.03	0.28	0.18	-0.18	-0.14	0.19	-0.41	0.16	-0.46
Heterosexuality	-0.06	-0.05	0.02	-0.03	-0.07	-0.09	-0.07	0.12	-0.14	-0.14	-0.18	0.00	0.79
Aggression	-0.06	-0.37	-0.07	-0.17	0.47	-0.03	-0.38	0.09	0.05	-0.18	0.16	0.06	-0.04
Consistency	0.04	-0.16	-0.16	-0.00	0.14	-0.03	0.10	-0.08	-0.76	0.05	0.05	0.01	0.34
Conservatism	0.78	0.11	0.09	-0.08	0.10	0.47	-0.04	0.11	0.12	0.13	-0.00	0.02	-0.02
Realism	-0.73	0.10	0.10	-0.06	0.16	0.40	-0.06	0.16	0.09	0.04	0.06	-0.04	0.00
Militarism	0.19	0.07	0.07	-0.10	0.16	0.79	-0.06	0.03	0.07	-0.02	-0.03	-0.01	0.04
Antihedonism	0.85	0.18	0.14	0.10	0.14	0.01	-0.02	0.00	-0.06	-0.05	0.02	0.01	0.04
Ethnocentrism	0.22	0.13	0.03	-0.15	0.28	0.01	-0.01	0.25	0.00	0.60	-0.32	-0.13	0.01
Religion	0.71	-0.14	-0.13	0.03	-0.09	0.29	0.12	0.08	0.25	0.04	0.06	0.12	-0.13
Neuroticism	0.04	-0.12	-0.11	0.04	0.45	-0.02	0.08	0.12	0.64	-0.11	0.09	-0.00	0.08
Extraversion	-0.01	-0.19	0.06	0.36	-0.31	0.21	-0.38	0.15	-0.26	-0.16	-0.21	-0.36	0.09
Lie	-0.09	-0.08	0.00	0.04	-0.12	0.03	-0.13	-0.07	-0.04	0.81	0.11	0.00	-0.18
Check	0.10	0.05	0.15	0.00	-0.02	0.01	-0.09	0.02	0.00	-0.06	-0.17	0.82	-0.01
Arithmetic	0.10	0.00	0.63	-0.07	-0.10	0.17	0.02	-0.30	-0.07	0.07	-0.12	0.32	0.20
ML	-0.02	-0.11	0.65	0.03	-0.04	-0.06	0.17	-0.07	0.03	-0.23	0.16	-0.40	-0.01
MQ	0.00	0.03	0.80	0.09	-0.07	0.00	-0.02	0.16	-0.01	0.12	-0.04	0.17	0.07

APPENDIX II - Matrix of Loading Factors

SECTION 6

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