

CHAPTER FIVE

RESULTS

1. INTRODUCTION

This chapter discusses the results of the survey questionnaire including response rates, respondent attributes, issues of significance and the factors emerging following factor analysis. Rasch measurement analysis was conducted on items associated with the derived factors and the resulting interval level scores used to undertake further multivariate analysis. The results were analysed using the Statistical Package for the Social Sciences (SPSS PC) Version 6.1.3 and QUEST-The Interactive Test Analysis computer software.

2. SAMPLE CHARACTERISTICS AND RESPONSE RATE

The 35 percent response rate for both sample groups was disappointing (see Table 17 p. 98). However, within the context of a one-pass (no follow-up) mail survey it was not unexpected. Nay-Brock (1984), Robinson (1989) and Talbot (1995) all discuss the varied response patterns for mail surveys which they identify as occurring between nil to ninety percent of the targeted sample. Waltz, Strickland and Lenz (1991, cited in Talbot, 1995) note that a response rate of 30 percent for mail questionnaires is not unusual. Nieswiadomy (1993) and Bailey (1987) cite incidences of mail surveys eliciting response rates varying between 10 percent and more than 90 percent. Bailey suggests that " ... many more studies achieve

response rates of 10 to 20 percent than achieve 90 percent rates" (Bailey, 1987, p.169).

Table 17.
Response Rates

	Sample	Prospective sample	Returned	Percentage
Number of Respondents	One	1980	726	36.6
	Two	1732	578	33.4
	Total	3712	1304	35.1

The reduced response rate may have been related to the length of the questionnaire and the time taken to complete. However, Robinson (1989) identifies that previous studies comparing short and long questionnaires tend to elicit similar return rates. Response rates for other studies that have examined attitudes to nursing research also demonstrated varied return rates that ranged from 23 percent to 78 percent (see also Table 1 p. 26).

For financial reasons it was not possible to conduct a second pass (follow-up). The literature suggests that response rates may be increased when reminder letters are sent, or the questionnaire redistributed but often only marginally (De Vaus, 1992).

The major issue is whether this was a biased sample and unrepresentative of the population of NSW registered nurses (Atkinson, 1988; Robinson, 1989; Talbot, 1995). Nay-Brock (1984) and Atkinson (1988) suggest that individuals who feel strongly about an issue are more motivated to return questionnaires and their extreme views may distort the real picture. For the researcher, representativeness on some criterion would assist in the development of confidence in the results of the survey. Consequently, the current survey sample characteristics (gender, age and employment position) were compared to the data arising from the NSW Health Department 1993 Nursing Workforce Annual Survey (K. Challey, personal communication, July 12, 1996) as a measure of representativeness of the sample survey (see Tables 18-20 pp. 99-101). As mentioned previously, the Health Department data is collected annually by the NSW NRB on behalf of the Workforce Planning Unit from responses by all nurses when renewing their eligibility to practice nursing certificates. Respondents to the Health Department survey include all classifications of nurses working in both the private or public health sectors and some small differences between the two surveys could be expected.

Table 18
Comparison of Sample Gender Numbers with 1993 NSW Health Department Survey.

<u>Respondent</u>	<u>NSW Health Department</u> Percentage	<u>Current Survey</u> Percentage
Female	92	91
Male	8	9
Total	n = 38,543	n = 1,303

The Health Department data are reported to have a general response rate of 85 – 90 percent with a varied level of response to different questions (K. Challey, personal communication, July 12, 1996). A very close approximation of the normal distribution of nurses by gender may be seen in Table 18 (p.99). Nursing is a predominantly female occupation and this is reflected in the percentage of male respondents for both surveys. The disproportionate gender mix is also reflected in the international literature where female respondents generally constitute 93–97 percent of the samples (Boothe, 1981; Bostrom et al., 1989; Bostrom & Suter, 1993; Eckerling et al., 1989; Ehrenfeld & Eckerling, 1991; Rizzuto et al., 1994).

Whilst age range numbers do not match perfectly there is a reasonable approximation given the differences in measurement band range in the different surveys (see Table 19).

Table 19
Comparison of Sample Age with 1993 NSW Health Department Survey.

<u>NSW Health Department</u>		<u>Current Survey</u>	
<u>Age Ranges</u>	<u>Percentage</u>	<u>Age Ranges</u>	<u>Percentage</u>
19-29	17	20-30	26
30-39	39	31-40	40
40-49	29	41-50	25
50-59	13	51-59	8
60+	2	60+	1
Total	N = 37,717		N=1,301

The greatest discrepancy occurs in the age range 20-30 where there is an over-representation of approximately 9 percent. The second discrepancy occurs in the 50-60 range where there is an under-representation by 5 percent. Over 66 percent of the respondents to this survey were less than 40 years of age. The response in the international literature is varied. Boothe (1981) reports less than 50 percent; Poster et al. (1992) less than 78 percent; Perez-Woods and Tse (1990) 62 percent; and Bostrom et al. (1989) less than 52 percent of their respondents as being less than 40 years. Conversely, Bostrom and Suter (1993) report that more than 50 percent of their sample were over the age of 35 years.

Similar to the age distribution, there are some minor differences between the two samples (see Table 20 p. 102). The RN and Clinical Nurse Specialist (CNS) group is under-represented by 6 percent. The Nursing Unit Manager (NUM) group is identically distributed. The Clinical Nurse Consultant (CNC) and Education groups are slightly over-represented relative to the general population. Administrators are slightly under-represented.

However, the differences in position of respondents overall, are not gross. The only other study of NSW nurses (Wright et al., 1996) did not include two position groups in their purposive sample: nurse academics and nurse administrators.

Table 20
Comparison of Sample Employment Position with 1993 NSW Health Department Survey.

Position	<u>NSW Health Department Survey</u> Percentage	<u>Current Survey</u> Percentage
RN or CNS	85	79
NUM	6	6
CNC	2	4
EDUCATION	2	7
ADMINISTRATION	5	5
Total	N = 37,573	N = 1,301

It was not unexpected that more than 80 percent of respondents to the current survey were engaged in clinical-based activities, given that, the majority of respondents had listed their employment position as RN, CNS or CNC. This group also forms the majority of respondents in other surveys examining attitudes to nursing research (Boothe, 1981; Bostrom et al., 1989; Bostrom & Suter, 1993; Eckerling et al., 1988; Ehrenfeld & Eckerling, 1991; Fugleberg, 1986; Perez-Woods & Tse, 1990; Rizzuto et al., 1994; Sellick et al., 1996).

In general, there is a reasonable approximation in the type of respondents for this survey and the 1993 NSW Health Department Workforce Planning Unit data. Whilst this reasonable approximation does not offer conclusive evidence of total representativeness, and caution is still required, there is provision for some degree

of confidence in the ability to generalise results. Additionally, the large number of respondents to the current survey (n=1304) does provide for more advanced statistical analysis.

Frequency distributions for the remaining general biographic and demographic characteristics of respondents are located in Tables 21 to 23 (pp.103-105). A substantial number of respondents (963/1301; 74%) were engaged in full-time employment. Thirty-five percent of respondents had less than ten years of nursing experience (see Table 21). The sample response is not markedly dissimilar to overseas studies report years of professional nursing experience: 42 percent (Ehrenfeld and Eckerling, 1991); 40 percent (Boothe, 1981); and 47 percent (Perez-Woods and Tse, 1990). Comparative data for professional experience relating to the two published Australian studies was not available (Selleck et al., 1996; Wright et al., 1996).

Table 21
Years of Professional Nursing Experience.

Number of Years	N	Percentage
< 2	27	2
2-5	193	15
6-10	233	18
11-15	289	22
16-20	227	17
21-30	237	18
> 30	97	8
Total	N = 1,303	100

Almost half of the respondents (50.5%) had only a basic nursing certificate as their highest qualification. Less than 4 percent had qualifications relating to Honours, Masters or Doctoral levels of education (see Table 22). This contrasted with the qualifications in progress that revealed 8.2 percent attempting higher level educational qualifications (see Table 23 p.105).

Table 22
Highest Educational Qualifications Completed.

Qualification	N	Percentage
Basic Nursing Certificate	953	50.5
Associate Diploma/Post Basic Certificate	51	3.9
Diploma	232	18.0
Degree	244	18.9
Honours	4	0.3
Post Graduate Diploma	62	4.8
Masters (Coursework)	38	2.9
Masters (Research)	7	0.5
Doctor of Philosophy	1	0.1
Unknown	12	
Total	1304	100

There is a difference in the range and type of qualifications available for nurses between Australia and overseas countries. This is partly due to earlier movement into the higher education sector for basic preparation of nurses overseas and the relative weighting of international diplomas and degrees. Thus comparisons with international studies could be problematic.

Table 23
Continuing Education (Educational Qualifications in Progress).

Qualification in Progress	N	Percentage
Nil	789	62.9
Associate Diploma/Post Basic Certificate	139	11.1
Diploma	33	2.5
Degree	140	11.2
Honours	3	0.2
Post Graduate Diploma	48	3.8
Masters (Coursework)	68	5.4
Masters (Research)	23	1.8
Doctor of Philosophy	12	1.0
Unknown	49	
Total	1304	100

The Australian studies revealed some differences in respondents' qualification levels. Approximately 50 percent of this survey's respondents held only a basic nursing certificate. Selleck et al. (1996) in their Victorian study determined that

65 percent of respondents (N=458), compared to the NSW based Wright et al. study (1996) where only 37 percent (N=410) held basic certification as their highest qualification. A higher proportion of respondents in this survey (>11%) had completed postgraduate qualifications compared with the Selleck et al. (1996) study (approximately 8%) and Wright et al. (1996) study (2.5%). This difference could be related to the geographic and purposive or convenience nature of the sampling processes of both the other Australian studies.

The majority of respondents in this investigation (1015/1299; 78.1%) indicated that their basic preparation to practice as a registered nurse had occurred in a hospital-based nursing education program.

3. PREPARATION TO CONDUCT NURSING RESEARCH

More than 50 percent (716/1255; 57.1%) of respondents received no formal preparation to conduct research. Further information pertaining to how nurses acquired the skills and knowledge to participate in nursing research is located in Table 24 (p.107).

It was interesting to note that less than 11 percent (135/1120) were prepared in their basic education program. One explanation could include the large number of nurses prepared in the hospital-based system that did not routinely include research methods as part of the curriculum.

Table 24

Preparation to Participate in Nursing Research

<u>Type of Preparation</u>	<u>Attended</u> Percentage	<u>Non-attendance</u> Percentage	Total n
Pre-Registration Course	10.8	89.2	1255
Research Workshops	30.1	69.9	1255
Degree Level Course	29.3	70.7	1255
Masters Level Course	6.7	93.3	1256

Responses to the type of further course needed by respondents are listed in Table 25. Only a small number of nurses perceived no need for further research courses. This compares favourably with the findings of Selleck et al. (1996) who found that 42 percent (189/450) 'definitely' and 46 percent (207/450) 'maybe' would participate in a research skill and knowledge upgrade. In this survey, a greater percentage of nurses indicated a need for a major course of study to enhance their knowledge and skills relating to nursing research than a refresher type program.

Table 25.

Perceived Educational Need to Conduct Nursing Research.

<u>Type of Course</u>	<u>Yes</u> Percentage	<u>No</u> Percentage	Total n
No further course required	4.0	96.0	1282
Major research course	41.5	57.5	1282
Refresher course	31.7	68.3	1282

Respondent preferences for specific research course content are located in Table 26. There appeared to be a low level of interest in specific subjects relative to the earlier finding that only a small number of respondents did not need any further research course preparation.

Table 26
Course Content Required to Conduct Research.

<u>Subject</u>	<u>Required Percentage</u>	<u>Not Required Percentage</u>
Research question identification	21.6	78.4
Literature review	16.9	83.1
Identifying & defining variables	24.1	75.9
Research design	27.8	72.2
Sampling	19.7	80.3
Data collection procedures	24.3	75.7
Data analysis	27.5	72.5
Interpreting results	25.4	74.6
Preparation of a research proposal	23.6	76.4
Reporting research results	25.0	75.0
Total N = 1282	100	100

Research design, analysis and the interpretation and reporting of results were considered the most necessary. The content area where respondents felt the most comfortable was related to literature review.

Less than half of the respondents (407/1282; 40.8%) indicated a need for access to a research consultant to assist them to conduct nursing research.

Contingency tables were prepared to examine the proportional differences in gender, age, years of nursing experience, major area of practice, training program, employment status, highest educational qualifications and qualifications in progress as the independent variables in relation to perceived nursing research process educational needs and experiences (dependent variable). Chi square analysis was used to determine the differences in significance for the variables stated. Significant chi square results are listed in Appendix D.

A number of groups exhibited proportionately different responses in relation to their educational preparation to conduct nursing research. Hospital trained nurses (47.3%) had a higher reporting of a lack of educational preparation than those nurses who received their basic training in a university (27.3%). Nurses working part-time (60.1%) also expressed a lack of research education compared to full-time (37.7%) and casual staff (30.4%). Nurse clinicians (46.7%) were more likely to have received no formal preparation compared to their colleagues in administration (26.8%), education (19.6%), and research (14.3%). Nurses with less than five years professional experience (28.7%) reported a proportionately lower incidence of a lack of preparation compared to nurses with 5-20 years (46.9%) or 20 plus years (42.8%) of professional nursing experience. Nurses with certificate level qualifications (62.1%) reported a comparatively higher proportion

of a lack of preparation compared to those nurses who held a diploma/degree (21.6%), postgraduate diploma (21.3%) or honours or higher level postgraduate qualification (2%). Nurses who were not undertaking any further qualifications at the time of the study reported a proportionately different lack of preparedness to conduct research (53.6%) than those nurses undertaking postbasic certificates (39.4%), diploma/degree (29.6%), postgraduate diploma (24.4%) and honours or higher level postgraduate courses (5.7%).

The majority of nurses reported a lack of preparedness by their pre-registration course to prepare them to conduct nursing research. Nurses who trained in a hospital-based program were proportionately less likely to have received preparation (6.4%) compared to those nurses that trained in a university based program (26.2%). Part-time nurses indicated a lack of preparedness via their pre-registration course (6%) compared to full-time (12.1%) or casual (21.7%) nursing colleagues. Nurses with less than five years nursing experience (27.3%) were more likely to have received research preparation during their preregistration program than those with 5-20 years (8.2%) or 20 plus (5.6%) years of experience. Nurses with certificate level (6.1%) and honours or higher level postgraduate qualifications (4%) less likely to have received preregistration research preparation compared to those nurses with diploma/degree (17.9%) or postgraduate diploma qualifications (14.8%).

Full-time employed nurses (33%) compared to part-time (22.6%) or casual

nursing employees (13%) reported proportionately different preparation to conduct nursing research through research workshop attendance. Nurses with 5 to 20 years of professional experience (31.1%) had a proportionately higher attendance at research workshops than those with less than 5 years (22.2%) or more than 20 years experience (29.8%). Nurses working in research (71.4%) and education (44.6%) reported a proportionately different attendance at nursing research workshops than clinicians (28.3%) and administrators (29.3%). Nurses with Honours or higher level postgraduate qualifications (54%) had a proportionately higher response to research workshop attendance than those with certificate (30.8%), diploma/degree (26.3%) or postgraduate diploma qualifications (34.4%).

The perception of the need for further research courses differed between groups of respondents. The majority of nurses agreed there was a need for a further course of study. However, Honours or higher level postgraduate qualified nurses (22%) indicated proportionately less need than those with certificate (2%), diploma/degree (3.6%) or postgraduate diploma (14.5%) qualifications. Male nurses (9.9%) indicated a proportionately less need for further courses than female nurses (3.4%).

In terms of the perceived need for a major course of study as preparation to conduct nursing research, female nurses' (43.1%) expressed a proportionately higher need than male colleague's (26.4%). Proportionately more nurses trained in

hospital based programs (45.2%) required a major research course than university trained nurses (28.3%). Nurses who had between 5 to 20 years (46.5%) nursing experience preferred a major course of study compared to those with 20 plus years (39.5%) and those with less than five years experience (27.4%). Clinicians (46%) required a major course of study compared to administrators' (22.4%) and those involved in nurse education (12%). The majority of part-time staff (56%) preferred a major course of study to the proportions indicated by full-time (37.3%) and casual employees (21.7%). Similarly, nurses with only certificate level qualifications (58.8%) indicated their need for a major course of study relative to those with diploma/degree (23.5%) or postgraduate diplomas (19.4%). Nurses holding honours or higher level postgraduate qualifications did not perceive the need for a major course of study.

Nurses employed in casual positions (56.5%) required a refresher program to assist them in being prepared to conduct research compared to full-time (34.2%) or part-time (22.3%) staff. Nurses with less than 5 years experience (50.2%) perceived a proportionately higher need for a refresher program than those did with 5-20 years (28.1%) and more than 20 years (25.1%) of nursing experience. University prepared nurses (53.4%) also proportionately recognised the need for a refresher program compared to hospital trained nurses (25.6%). Refresher programs were needed comparatively more by nurses holding degrees or diploma (48.8%) compared to those with certificate (21.2%), postgraduate diplomas (32.3%) or honours/higher level postgraduate (22%) qualifications.

Nurse researchers (57.1%), administrators (51.8%) and nurse educators/academics (69.6%) perceived a higher proportion of need to access a consultant to assist them in the conduct of nursing research compared to clinicians (37%). Casual staff (52.2%) felt that access to a consultant would be valuable relative to full-time (43.4%) and part-time (52.2%) staff. Certificate level nurses (30.9%) perceived less need for access to a research consultant than those with higher level postgraduate degrees/honours (70%), postgraduate diplomates (50%) and those nurses holding a degree or diploma (51%).

4. ITEM ANALYSIS OF NURSING ATTITUDE, SELF ESTEEM AND JOB SATISFACTION VARIABLES

The items were categorised prior to administration of the inventory into major elements (ie. barriers, knowledge, interest, environmental support, payoffs or benefits and utilisation relating to conduct of nursing research). Appendix E outlines the response for all items related to the respondents' attitudes to nursing research, self-esteem and job satisfaction on the five point Likert scale ranging from strongly disagree (1), disagree (2), uncertain (3), agree (4) and strongly agree (5). Items posed in the negative were reverse-scored to facilitate later scaling.

Whilst items that comprised the inventory were primarily gleaned from previous literature, there was only one study (Boothe, 1981) where direct comparison of

responses could be achieved. This comparison must be approached cautiously on two points.

First, Boothe had written her items in the third person and anticipated that respondents would be referring to nurses' reaction as a group to the declarative statements. Despite this, the responses from both the present study and the Boothe study were similar. Thirty-four items from the Boothe inventory were compared in response. The means were similar for the majority of items and the standard deviation was also comparable except for two items. In the first instance, NSW nurses tended to disagree more that they were criticised by their peers for conducting research than Boothe's sample. The second item suggested that NSW nurses found that informed consent and patient recruitment was more difficult than Boothe's sample (Boothe, 1981). Direct comparisons of levels of agreement or disagreement were not possible, as this data was not published in Boothe's doctoral thesis.

The second aspect for caution relates to the comparison of means and standard deviations for ordinal scale items. Likert anchor points are considered somewhat arbitrary and there are no equal intervals between the various anchors (or steps). This suggests that means and standard deviations for ordinal scales may not hold a significant place in the interpretation of a particular item response (Argyrous, 1996).

Other literature that was not comparable included the Bostrom et al. (1989) study that used Boothe's inventory modified to the first person. Bostrom et al. reversed the scoring for items resulting in stronger agreement attracting a lower score. Other authors, (Fugleberg, 1986; Perez-Woods & Tse, 1990; Poster et al., 1992) only recorded percentage agreement/disagreement to selected items and there was no published raw score, mean or standard deviation of items to facilitate comprehensive comparison. Other studies only presented final results in relation to their inventories and did not discuss responses to individual items (Bostrom & Suter, 1993; Eckerling et al., 1988; Ehrenfeld & Eckerling 1991; Rizzuto et al., 1994).

It was not possible to compare the results of the Victorian study by Selleck et al. as any similar items were measured using a 100 mm Visual Analogue Scale and only the mean and standard deviation published. Wright et al. (1996), the other Australian study did contain items for which some comparison was possible. Although comparative items were expressed differently, some inference could be made relating to the central concepts being examined.

Wright et al. (1996) found that more than 80 percent (N=410) agreed that nursing research can help improve patient care. This differs from a similar item posed in this study relating to whether nursing research was important for improving patient care (Q. 80). Less than 43 percent (N=1288) agreed that research was

important for improving patient care. The difference could be explained by the stronger wording relating to 'importance of nursing research' used in this study.

Thirty-four percent of Wright et al. (1996) respondents (N=410) indicated they were interested in conducting research but did not have the skills. There was an increased agreement by the present respondents (44%; N=1273) to a similarly posed question (Q.71).

Respondents in the current survey indicated less agreement (56%; N=1285) in relation to conducting research if appropriate support was available (Q82) compared to the 72 percent (N=410) agreement by Wright et al. respondents (1996).

There was a similar response to the question relating to non-interest in conducting nursing research (Q.93). Nineteen percent of current respondents (N=1292) compared to 21 percent of Wright et al. respondents (N=410) indicated their lack of interest in conducting nursing research activities.

After examining differences in the items the next step was to explore construct validity and reliability for the scales.

5. CONSTRUCT VALIDITY AND RELIABILITY (1): FACTOR ANALYSIS

NURSING ATTITUDE ITEMS

Common factor analysis was conducted on 1,079 cases that had completed the 68 inventory items related to their attitude to nursing research. Items that were negative were recoded to reverse scoring. The sampling adequacy criterion that required a minimum of five subjects per item was met (De Vellis, 1991; Tabachnick & Fidell, 1996). The correlational matrix revealed a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.94. Tabachnick and Fidell (1996) advocate that an acceptable KMO value should exceed 0.6 for the factor analysis to proceed. Several procedures are recommended for initial factor extraction and these include the latent root (eigenvalues >1) criterion, the a priori criterion, percentage of variance criterion and Cattell's scree test criterion (De Vellis, 1991; Hair et al., 1995; Kim & Mueller, 1978b; Knapp & Brown, 1995; Tabachnick & Fidell, 1996). As this was not a replication study and the final number of factors not known or presupposed, the a priori criterion was not utilised (Hair et al., 1995). The latent root mechanism was examined but not pursued as 14 Factors were identified with an eigenvalue greater than 1.0. This was felt to be an inappropriate number of factors to support an interpretable solution. This decision is supported by Hair et al. (1995) who confirm that if there are more than 50 variables (items) under consideration too many factors may be extracted making interpretation difficult. The percentage of variance criterion was discarded as it would have required the extraction of 16 factors to satisfy the minimum of 60

percent variance accounted for in the solution. This was considered too cumbersome and would be unlikely to offer a succinct solution (Hair et al., 1995).

The initial factor extraction was completed following the conduct of a Cattell's Scree Plot (see Appendix F). This suggested that there were five factors that were pertinent to the analysis. However, this only accounted for less than 45 percent of the variance. A variety of further solutions were attempted to find the most parsimonious and interpretable solution (Graetz, 1991; Tabachnick & Fidell, 1996). These solutions included the use of alternative mechanisms for extracting the factors including Principal Axis Factoring (PAF) and Maximum-Likelihood factoring (ML). The number of factors to be extracted 6, 5 and 4 was also examined. Additionally, trial rotations in the orthogonal (Varimax and Quartimax) and oblique (Oblimin) were conducted. Rotations were performed to determine if the structure of the analysis could be simplified and thus more amenable to interpretation (Graetz, 1991; Hair et al., 1995; Tabachnick & Fidell, 1996).

The most parsimonious and interpretable solution was achieved using ML extraction, and Oblique rotation for four factors with listwise deletion of missing data. In this solution there was no cross loading of items between the factors. The minimum acceptance loading for an item was set at 0.3. This followed the recommendation by Hair et al. (1995) that factor loadings, when the sample is greater than 50, are considered significant if the loading is greater than +0.30, important if greater than +0.40 and very significant if greater than 0.50. The

loading for items in the factors ranged from 0.31 to 0.80. Nine items were found not to load on any of the factors and these were deleted (see Table 27) and the final analysis conducted. The final solution (pattern matrix) is presented in Table 28 (p.120).

Table 27
Nursing Attitude Scale: Non-Factor Loading Items

VARIABLE /ITEM (R = reverse score item)	1	2	3	4
12. Regularly reads nursing journals to keep up to date with current research activities	.26	.11	.06	.02
61. A reliable instrument is one which can be used by 2 different people and they....	.16	.10	-.00	.06
21. A valid instrument measures what it is intended to measure	.15	.11	.04	.12
51. Nursing research is the means by which the theoretical basis for nursing practice...	.09	.28	-.01	.11
81. Nursing research requires more from me than I am willing to give my job (R)	.13	.25	.04	.24
30. I am criticised by my peers when I conduct research (R)	-.06	-.06	.20	.27
79. I have no interest in reading the latest nursing research findings (R)	.12	.24	-.04	.27
64. The process of submission of a research proposal to a research and ethics....(R)	.15	-.03	.05	.22
47. Research findings advantageous to pt. care can be implemented02	.15	.16	.17

Factor 1 variable (item) loadings ranged from 0.49 to 0.80. The sixteen loading items all related to some aspect of knowledge of the nursing research process and the factor was thus labelled '*Knowledge*'. Factor 2 was labelled as '*Motivation*' and the 19 items related to aspects that might be construed to motivate a nurse to engage in nursing research. The item loadings for Factor 2 ranged between 0.31 and 0.78. Factor 3 contained 14 items that related to perceived support and encouragement for nurses to assist in the conduct of nursing research. The factor was labelled '*Support*' and the item loadings ranged from 0.36-0.79. Factor 4 contained eight items and the loading range was 0.32 – 0.69. The items seemed to relate to the concept of participation or being enabled to be involved in nursing research and Factor 4 was thus labelled '*Enactment*'.

Table 28
Nursing Attitude Scale: Final Solution and Factor Loadings

VARIABLE (R = Reverse score item)	FACTORS			
	1	2	3	4
39. Familiar with different scales of measurement used in data analysis	.80	.01	.01	-.09
15. Familiar with selected statistical procedures used in analysis of research findings	.79	-.05	.04	-.03
53. Understands differences/implications of different sampling techniques and sizes	.76	.02	.01	-.02
28. Could prepare a research proposal for submission to research & ethics committee	.72	.08	.01	.08
9. Can write research questions	.71	.03	.01	.06
19. Has skills and knowledge necessary to conduct research	.68	.02	.06	.04
17. No research design knowledge (R)	.64	-.09	-.02	.01
42. Able to interpret research results and findings	.64	-.01	.02	-.02
65. Good research report writing skills	.62	.08	.03	-.02
34. Difficulty in writing research hypotheses (R)	.62	-.05	-.08	-.06
95. Confident in preparing a conference paper	.60	.09	.04	.06
69. Can conduct computer data base literature searches	.60	.05	.04	.02
26. Difficulty understanding what statistical results mean (R)	.55	-.09	-.00	.04
57. No difficulty locating background literature for research study	.54	.06	.05	.12
4. Does not understand difference between independent and dependent variables (R)	.49	-.02	.01	.01
35. Readily identify research problems relevant to my work	.49	.13	-.04	.12
99. Conduct research if knew how to access research funding	-.05	.78	.04	-.08
71. If had research skills & knowledge then involved in research activities	-.16	.78	.05	-.01
62. Do research if knew how to analyse results and findings	-.14	.76	.06	-.09
91. Conduct research if relief time given to conduct research	.10	.73	-.14	.03
59. Conduct research if more funds available/accessible to use for this purpose	.21	.70	-.07	-.03
38. Conduct research if knew how to write a proposal	-.31	.66	.02	-.05
52. Interested in conducting research	.23	.65	-.02	.28
82. Conduct research if someone more knowledgeable would help me	-.17	.64	.00	-.02
25. Conduct research if I had the time	.17	.63	-.08	.10
33. I like to conduct research	.25	.55	.01	.27
93. Has research knowledge & skills, not interested in conducting research (R)	-.02	.55	-.05	.29
27. Would like to conduct a study of a problem in patient care	.01	.55	-.03	.16
14. Would conduct research if patient assignments were lightened	.10	.53	-.13	-.04
45. Conduct research because it is of benefit for a positive performance appraisal	.07	.47	.09	-.19
73. Conduct research because it assists me to be promoted	.14	.37	.20	-.20
80. Research is the most important activity for improving patient care	.07	.36	.06	.05
11. Will conduct research because it will assist me in being promoted	.10	.34	.19	-.13
97. The advancement of nursing knowledge can only be achieved through research	.07	.34	.04	.06
5. I put research high on my list of priorities	.21	.33	.16	.21
20. Conducting research is not a priority (R)	.06	.31	.08	.29
32. Employer provides ample assistance to conduct research	.01	-.11	.80	-.00
13. Employer provides consultative assistance to conduct research	.03	-.07	.74	.04
22. Employer has ample assistance for analysis of results and findings	.01	-.08	.70	-.05
75. Working environment provides ample opportunity to conduct research	.02	-.06	.70	.01
88. Employer has ample statistical assistance for anyone wishing to conduct research	-.00	-.04	.67	-.04
43. My job provides ongoing educational programs in order to conduct research	.03	-.04	.64	-.10
46. My supervisor/s allow me time in their daily assignments to conduct research	.03	.01	.58	-.03
3. My job provides the time necessary to conduct research	.07	-.05	.54	-.02
83. My peers in nursing encourage me to conduct research	-.04	.20	.51	.15
40. Employer has ample secretarial assistance for anyone wishing to conduct research	-.02	-.06	.51	-.14
96. My peers in nursing assist me to conduct research	.08	.11	.48	.12
60. My colleagues (other health professionals) encourage me to conduct research	.04	.19	.45	.12
6. Receive praise from peers and colleague when conduct research	.02	.09	.43	.15
58. Receive praise from peers and colleagues if completed a research project	-.11	.16	.36	.18
77. Nursing research should only be conducted by professional nurse researchers (R)	.06	-.01	-.02	.70
8. Nursing research only be conducted by nurse academics from universities (R)	.01	.07	-.04	.61
94. Nursing research should only be conducted by nurses with university degree (R)	-.04	.02	-.01	.60
37. Only member health team, other than nurses should conduct nursing research (R)	-.00	.00	-.06	.49
16. Nursing research should only be initiated by nurses working in the clinical area (R)	.03	-.08	.02	.46
78. Informed consent process for employee participation prevents research (R)	.10	-.19	.06	.44
68. Time spent giving patient care is more important than time conducting research (R)	.13	.18	.01	.36
72. Patient participation in nursing research is difficult to obtain (R)	.07	-.04	.05	.33
31. All registered nurses could engage in nursing research	.06	.25	.08	.33

Cronbach's coefficient alpha was calculated for each of the four factor groupings of items to determine homogeneity and internal consistency (see Table 29 p.121-122). All items were above 0.3 in the 'Corrected Item – Total Correlation' columns and thus considered worthy of retention. No item was identified for deletion to substantially improve the calculated alpha score (Talbot, 1995). The alpha scores were Factor 1 = 0.92, Factor 2 = 0.91, Factor 3 = 0.88, and Factor 4 = 0.75. Each of the alpha scores was above the minimum score for the development of a new scale, that is 0.7 (De Vaus, 1992; Talbot, 1995). De Vellis (1991) suggests that alpha scores below 0.65 are unacceptable; between 0.65 and 0.70 minimally acceptable; between 0.70 and 0.80 respectable; and above 0.80 is considered very good.

Table 29
Nursing Attitude Scale: Cronbach Coefficient Alpha Reliability Analysis.

Factor	Alpha	Item number	Corrected item-total correlation	Alpha if item deleted
1. Knowledge	0.92	39	.73	.91
		15	.73	.92
		53	.73	.92
		28	.75	.92
		9	.73	.92
		19	.68	.92
		17	.58	.92
		42	.62	.92
		65	.62	.92
		34	.57	.92
		95	.64	.92
		69	.61	.92
		26	.52	.92
		57	.60	.92
		4	.49	.92
35	.52	.92		

Factor	Alpha	Item number	Corrected item-total correlation	Alpha if item deleted
2. Motivation	0.91	91	.68	.90
		99	.69	.90
		38	.49	.91
		59	.68	.90
		62	.64	.90
		82	.53	.91
		25	.66	.90
		14	.48	.91
		27	.57	.91
		33	.66	.90
		52	.74	.90
		5	.49	.91
		93	.54	.91
		20	.43	.91
		71	.67	.90
		11	.39	.91
		45	.46	.91
		73	.41	.91
80	.43	.91		
97	.40	.91		
3. Support	0.88	32	.69	.87
		13	.64	.87
		22	.61	.87
		75	.62	.87
		88	.60	.87
		43	.58	.88
		46	.57	.88
		3	.48	.88
		83	.60	.87
		40	.43	.88
		96	.55	.88
		60	.54	.88
		6	.48	.88
		58	.42	.88
4. Enactment	0.75	72	.31	.75
		78	.38	.74
		8	.54	.71
		16	.39	.73
		31	.35	.74
		37	.44	.73
		68	.37	.74
		72	.62	.70
		94	.49	.72

JOB SATISFACTION

As the author was interested in the possible relationships between job satisfaction and self esteem and the factors related to attitudes to nursing research, it was decided to examine these constructs as discrete variables. The variable items had been previously validated but their performance in the context of this study was not known.

An unrotated one-factor analysis and reliability estimate was conducted on the 18 items pertaining to job satisfaction. The KMO sampling adequacy was 0.91. The test of fit for a 1-factor model was significant (Chi-square =1359.01; df =135; $p < 0.0001$). Factor loadings for a single factor solution using maximum likelihood extraction revealed a range from 0.73 to 0.25.

Previously, items that failed to load at 0.3 were deleted from the analysis. However, a decision was taken to retain the one item that loaded less than 0.3. This decision is supported by Knapp and Brown (1996) and Hair et al. (1995) who suggest in large sample sizes it may be appropriate to accept a lower level for significance. Previously, with the 'nursing attitude scale' this decision was not adopted as a concurrent effort was being undertaken to reduce the number of items in the final proposed scale. Cronbach's alpha for job satisfaction factor was 0.86. See Table 30 for a summary of the job satisfaction factor loadings and reliability estimates.

Table 30
Job Satisfaction Factor Loading and Reliability Estimate.

Item Number	Factor Loading	Corrected Item-Total Correlation	Alpha if item deleted
48	0.73	0.67	0.85
44	0.69	0.63	0.85
54	0.67	0.60	0.85
89	0.66	0.60	0.85
23	0.60	0.55	0.85
29	0.58	0.53	0.85
70	0.55	0.52	0.85
10	0.53	0.50	0.86
92	0.52	0.49	0.86
36	0.48	0.45	0.86
50	0.47	0.44	0.86
18	0.45	0.41	0.86
100	0.44	0.43	0.86
41	0.43	0.41	0.86
85	0.39	0.37	0.86
76	0.38	0.36	0.86
1	0.37	0.35	0.86
7	0.25	0.23	0.86

SELF-ESTEEM

An unrotated one-factor analysis and reliability estimate was conducted on the 10 items relating to self esteem. The KMO sampling adequacy was 0.88. The test of fit for a 1-factor model was significant (Chi-square =758.81; df =35; $p < 0.0001$). Factor loadings for a single factor solution using maximum likelihood extraction revealed a range from 0.83 to 0.28. In line with the decision taken earlier with the job satisfaction items, the one item (0.28) which loaded less than 0.3 was retained (Knapp & Brown, 1996; Hair et al. 1995). Cronbach's coefficient alpha for the factor was 0.86. A minor improvement was suggested (to delete item 49), but a

decision was taken to retain this item as only marginal gain in overall alpha could be achieved. See Table 31 for a summary of the factor loadings and reliability estimates.

Table 31
Self-Esteem Factor Loading and Reliability Estimate.

Item Number	Factor Loading	Corrected Item-Total Correlation	Alpha if item deleted
87	0.83	0.71	0.84
86	0.81	0.69	0.84
98	0.72	0.68	0.84
84	0.69	0.66	0.84
63	0.67	0.65	0.84
56	0.65	0.64	0.85
2	0.60	0.57	0.85
24	0.55	0.54	0.86
90	0.41	0.41	0.86
49	0.28	0.26	0.87

6.0 CONSTRUCT VALIDITY AND RELIABILITY: RASCH MEASUREMENT MODEL ANALYSIS

The decision to undertake Rasch analysis was twofold. As stated previously, the explained variance for the identification of the four factors directly related to attitudes to nursing research explained less than forty-five percent of the variance. This is considered too low for social science investigations that usually set the minimum threshold at sixty percent (Hair et al., 1995; Tabachnick & Fidell, 1996). Consequently, factor scores could not be confidently used in subsequent analysis. Rasch modelling offered a more precise analysis of the data in addition

to providing objective equal-interval scores to facilitate further multivariate analysis (Chern, Keilhofner, De Las Heras & Magalhaes, 1996; A. Fisher, 1993; W.P. Fisher, 1993, Wright & Masters, 1982). Rasch analysis provided an opportunity to assess the reliability of items and cases, the construct validity of items, internal consistency as well as the derivation of equal-interval scores for each case on each of the four factors (*knowledge, motivation, support and enactment*). *Self-esteem* and *job satisfaction* variables could also be analysed using the Rasch model and equal-interval scores obtained that facilitated the exploration of relationships between the possible predictor variables (*knowledge, motivation, support, enactment, job satisfaction or self-esteem*) and criterion variables such as *age, years of professional experience, major area of practice and educational qualifications*.

The first step in Rasch analysis was to examine the fit of the data to the model using item and case (respondent) reliability indexes, item fit statistics and the internal item consistency index. Item and case reliability estimates should be greater than 0.7 (Wright & Masters, 1982). The Infit Mean Square (MnSq) for both items and cases should be in the range of 1.0 ± 0.3 . Items that are greater than 1.3 are considered to be variant or erratic and suggest that the item probably does not belong in the scale, or that there is a problem with item definition thus threatening construct validity. A MnSq value of less than 0.7 suggests that the item does not discriminate between persons with different amounts of the variable under examination (eg. Knowledge or self esteem). However, it is the items with a

higher than acceptable MnSq which pose the greatest threat to construct validity (Chern et al., 1996).

A summary of the location of all the items within the acceptance range defined by the Infit MnSq is usually presented and examined. Thus items outside the acceptance range can be readily identified and if threatening then considered for deletion from the scale. Item difficulty (delta parameter) refers to which is the most difficult item, and which is the easiest, are usually examined in addition to which steps for what items are the most difficult to achieve. Step difficulty relates to the movement between each of the Likert scale anchors for each item. Step 1 relates to movement between 'strongly disagree' to 'disagree'; Step 2 to movement between 'disagree' and 'uncertain'; Step 3 the movement between 'uncertain' and 'agree'; and Step 4 the movement between 'agree' and 'strongly agree'. Step difficulty within items is estimated by the tau parameters, while Thurstonian thresholds are used for comparison across items. While a certain item may have the highest overall item difficulty, another item may have the more difficult step for respondents to achieve in terms of extremeness of opinion. Separation of the steps in terms of bands for the four steps is also examined. Step 4 should be the most difficult for each item. Ideally, this is reflected in the Thurstonian scales with step 4 of items clustering to the top band, step 3 of items clustering in the next band, step 2 into the next band of items and finally, step 1 clustering as the lowest band of items (Wright & Masters, 1982; Wright & Stone, 1979).

Particular attention should be paid to reverse scored items to ensure that the interpretation is correct. The internal consistency index should also be examined to assess reliability. For polychotomously scored items it is equivalent to Cronbach's alpha coefficient and should exceed 0.7 (Wright & Masters, 1982). An examination of the distribution of respondents is also conducted although approximation to a normal curve distribution is not considered critical.

The investigator must then carefully reflect on these findings and the distribution of cases to achieve a meaningful interpretation of whether the scale is valid and reliable and determine if the derived equal-interval scores can be used with confidence in further multivariate analyses (Chern et al., 1996; A. Fisher, 1993; Wright & Masters, 1982; Wright & Stone, 1979).

RELIABILITY ESTIMATES, INFIT MEAN SQUARE AND INTERNAL CONSISTENCY INDEX

Table 32 (p.129) summarises the reliability estimates for items and cases in the subscales: knowledge, motivation, support, enactment, self-esteem and job satisfaction. The table also displays the infit mean square and standard deviation for both subscale items and cases. In addition, the internal consistency index for all subscales is presented.

Table 32

Summary of Subscale Item and Case Reliability Estimates, Mean Square Infit and Internal Consistency Index.

Subscale	Item Reliability Estimate	Item MnSq Infit	Item MnSq SD	Case Reliability Estimate	Case MnSq Infit	Case MnSq SD	Internal Consistency Index
Knowledge	0.83	1.00	0.20	0.92	1.04	0.76	0.92
Motivation	0.89	1.00	0.20	0.91	1.04	0.71	0.91
Support	0.87	1.00	0.14	0.88	1.03	0.68	0.88
Enactment	0.94	1.00	0.17	0.77	1.05	0.80	0.75
Self Esteem	0.47	0.99	0.28	0.84	1.03	1.25	0.86
Job Satisfaction	0.95	1.01	0.18	0.87	1.04	0.64	0.86

KNOWLEDGE SUBSCALE

The *knowledge* subscale demonstrated good fit of the data to the model as demonstrated by the reliability estimates for items (0.83) and cases (0.92) exceeding >0.7 . This suggests that a similar item spread would be achieved if the scale were administered to a similar set of subjects. The item mean square infit was ideal (1.0) and the case mean square infit also close to ideal (1.04). Internal consistency for the subscale was high (0.92). A high level of construct validity is indicated if no more than five percent of the items (ie. one item) are outside the upper limits of the acceptance range for the subscale (Chern et al., 1996). Only one item (15, Q4 – ‘Does not understand the difference between independent and dependent variables’) had an item mean square falling outside the maximum acceptance range (see Figure 5 p.129). Two items, 3 (Q53 – ‘I understand the

differences and implications of different sampling techniques and sizes’) and item 4 (Q28 –‘I would be able to prepare a research proposal for submission to a research and ethics committee’) were borderline for the minimum acceptance range. This could be interpreted as these two items not being able to discriminate between persons with different levels of knowledge relating to nursing research.

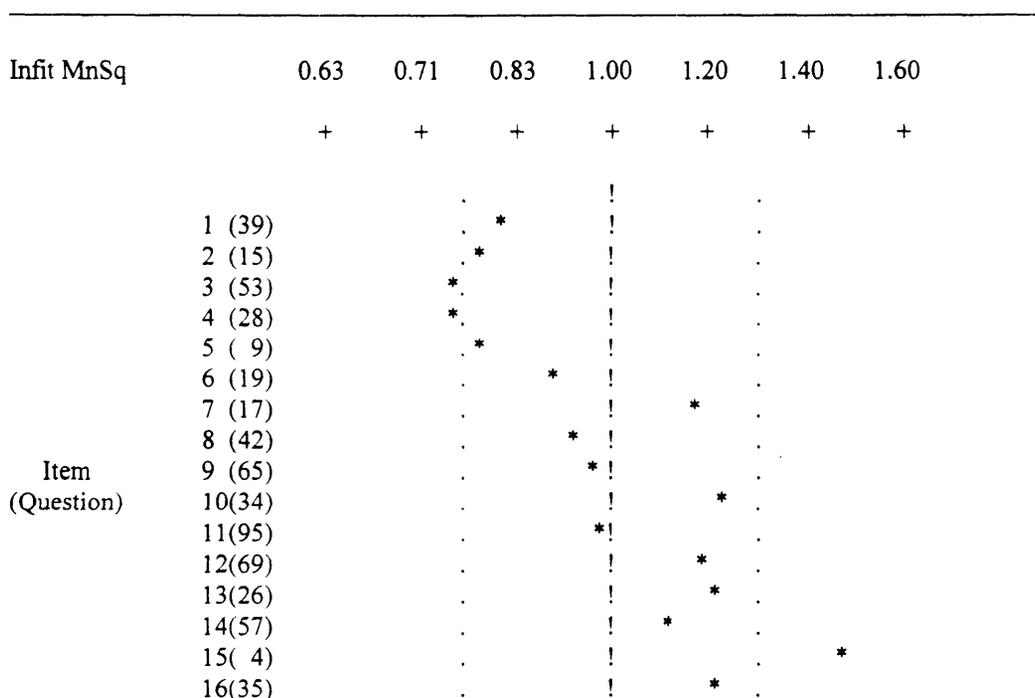


Figure 5. Knowledge subscale mean item fit.

Note: Legend -: = acceptance range; ! = ideal item fit ; * item location

Overall item difficulty for the knowledge subscale is summarised in Table 33 (p.131). The most difficult item was item 1 (Q39) – ‘I am familiar with different scales of measurement which could be used in data analysis’. The easiest item was item 16 (Q35) –‘I can readily identify research problems relevant to my work’.

Table 33
Knowledge Subscale: Mean Overall Item Difficulty.

Order of Difficulty	Item No.	Question No.	Difficulty Level	Item Statement
1	1	39	0.40	Familiar with different scales of measurement
2	12	69	0.39	Understand how to do a computer literature search
3	10	34	0.34	Has difficulty writing hypotheses (R)
4	7	17	0.33	Doesn't know which research design is appropriate
5	4	28	0.32	Able to prepare proposal for research & ethics c'tee
6	2	15	0.30	Familiar with selected statistical procedures
7	22	95	0.25	Feel confident about preparing a conference paper
8	9	65	0.09	Have good research report writing skills
9	5	9	0.01	Can write research questions
10	3	53	- 0.15	Understands differences & implications of sampling
11	15	4	- 0.18	Doesn't understand differences between IV and DV (R)
12	8	42	- 0.27	Can interpret most results and findings in research report
13	6	19	- 0.30	Have skills and knowledge to conduct research
14	14	57	- 0.44	Have no difficulty in locating background literature
15	13	26	- 0.52	Has difficulty understanding statistical results mean (R)
16	16	35	- 0.56	Can identify research problems to my work

Note: (R) = reverse scored item.

The most difficult category for respondents to agree with was step 4 in item 8 (Q42) ie. 'Strongly agree' response to 'I can interpret most results and findings in a research report' and also step 4 item 9 (Q65) 'I have good research report writing skills' (see Figure 6 p.133). This suggests that respondents who scored low on the knowledge subscale would be unlikely to respond in that category. The easiest step was to move from 'strongly disagree' to 'disagree' (step 1) for item 13 (Q26) 'I have difficulty understanding what statistical results mean'.

Thurstonian thresholds (or across step comparisons) for the knowledge subscale items are located in Figure 6 (p.133). There is a discrete banding and separation

for step 4 of all items from step 3. These items are located between 1.54 and 3.59 logits. A similar pattern of discrete banding between steps 3 and 2 is not as evident. Step 2 of items 7 (Q17 –‘I would not know which research design was appropriate for different research projects’) and 12 (Q69 –‘I understand how to conduct a computer database literature search’) are more difficult to achieve than step 3 of items 8 (Q42-‘I can interpret most results and findings in research reports’), 16 (Q35- ‘ I can readily identify research problems relevant to my work’) and 13 (Q26 – ‘I have difficulty understanding what statistical results mean’). Discrete banding between step 2 and 1 is apparent with the exception of step 1 of item 12 (Q69) that was located on the same level as step 2 of item 16(Q35).

A summary of results for the tau parameters (within step comparisons) for each item is reported in Table 34 (p.134). For all items the most difficult step to achieve was step 4. The easiest step to achieve was step 1. Steps 2 and 3 were varied in their difficulty to achieve.

The item counts, percentage and infit mean square for each item in the knowledge subscale is located in Appendix G.

Logits Scale	Item and Step				
4.0					
	8.4	9.4			
	1.4				
3.0	2.4				
	3.4	5.4	7.4	10.4	11.4
	4.4	12.4	16.4		
	6.4				
2.0					
	14.4				
	15.4				
1.0					
	1.3	4.3	7.3	9.3	10.3
	12.3				
	2.3	5.3			
	3.3	15.3			
0.0	6.3	7.2	12.2	14.3	
	8.3	10.2			
	1.2	2.2	4.2	11.2	16.3
	13.3	15.2			
-1.0					
	5.2	9.2	13.2	14.2	
	3.2	6.2			
	8.2				
	12.1	16.2			
	2.1	4.1	15.1		
-2.0	1.1	10.1	11.1		
	5.1	7.1			
	3.1				
	6.1	14.1			
	9.1				
-3.0	8.1	16.1			
	13.1				
-4.0					

Figure 6. Knowledge subscale: Thurstonian thresholds

Table 34
Knowledge Subscale: Tau Parameters.

Item	Question	Step 1	Step 2	Step 3	Step 4
1	39	- 2.35	- 0.53	0.07	2.87
2	15	- 2.00	- 0.30	- 0.03	2.63
3	53	- 2.13	- 0.91	0.12	2.93
4	28	- 1.85	- 0.64	0.34	2.15
5	9	- 1.82	- 0.94	0.13	2.63
6	19	- 2.00	- 0.94	0.23	2.70
7	17	- 2.36	- 0.08	0.15	2.29
8	42	- 2.15	- 0.93	- 0.16	3.59
9	65	- 2.75	- 1.16	0.69	3.22
10	34	- 2.28	- 0.22	0.01	2.48
11	95	- 2.17	- 0.51	0.26	2.42
12	69	- 1.89	0.21	- 0.42	2.10
13	26	- 2.73	0.19	- 0.82	3.37
14	57	- 1.99	- 0.25	0.10	2.15
15	4	- 1.45	- 0.24	0.14	1.54
16	36	- 2.25	- 0.94	0.02	3.17

Note: For item statements declared in the positive:
 Step 1 - movement between 'strongly disagree' and 'disagree'
 Step 2 - movement between 'disagree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'agree'
 Step 4 - movement between 'agree' and 'strongly agree'

For item statements declared in the negative:
 Step 1 - movement between 'strongly agree' and 'agree'
 Step 2 - movement between 'agree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'disagree'
 Step 4 - movement between 'disagree' and 'strongly disagree'.

The distribution for respondents is displayed in Figure 7. Individuals located at the right of the diagram could be seen to possess more knowledge than those located on the left. The distribution appears to approximate the normal curve with the majority of respondents clustering around the mean.

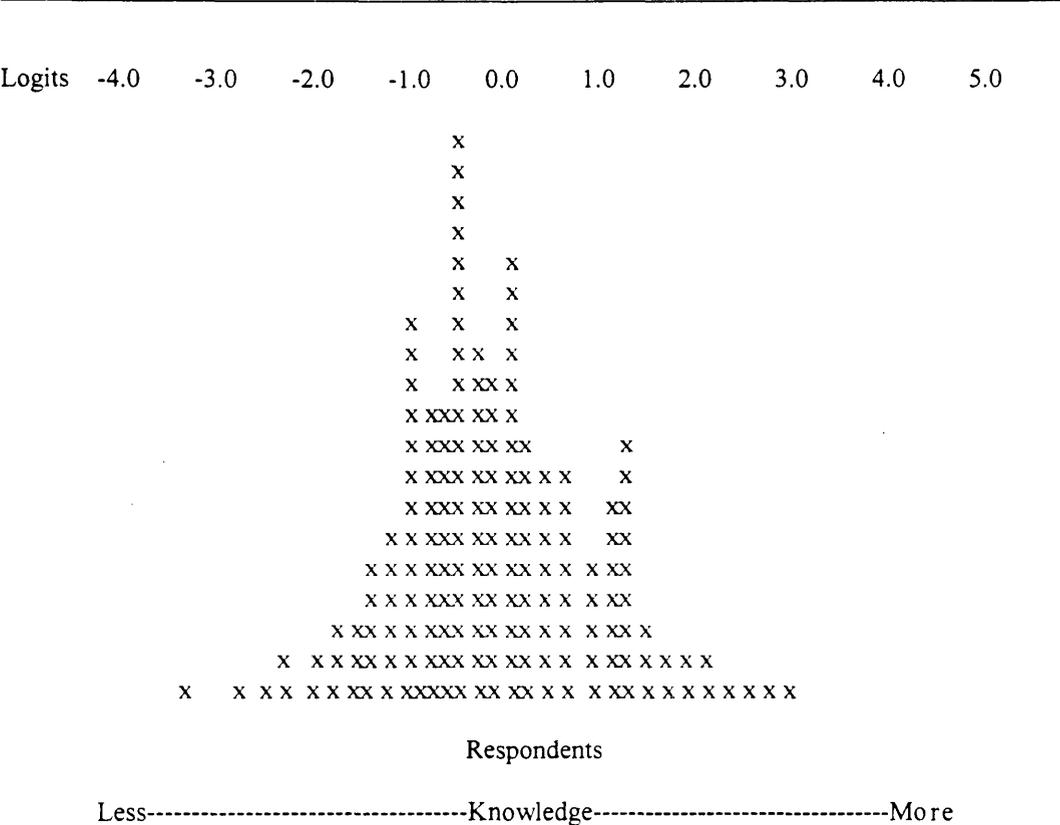


Figure 7. Knowledge subscale: respondent distribution

In summary, the knowledge items constitute a valid and reliable subscale and the derived score can be used confidently in further multivariate analysis.

MOTIVATION SUBSCALE

The motivation subscale also demonstrated good fit of the data to the model. The reliability estimate for items (0.89) and cases (0.91) were above the minimum acceptance level (see Table 32 p.129). The item mean square infit was ideal (1.0) and the case mean square infit close to ideal (1.04). Internal consistency was high (0.91). Figure 8 displays the mean item fit for the subscale.

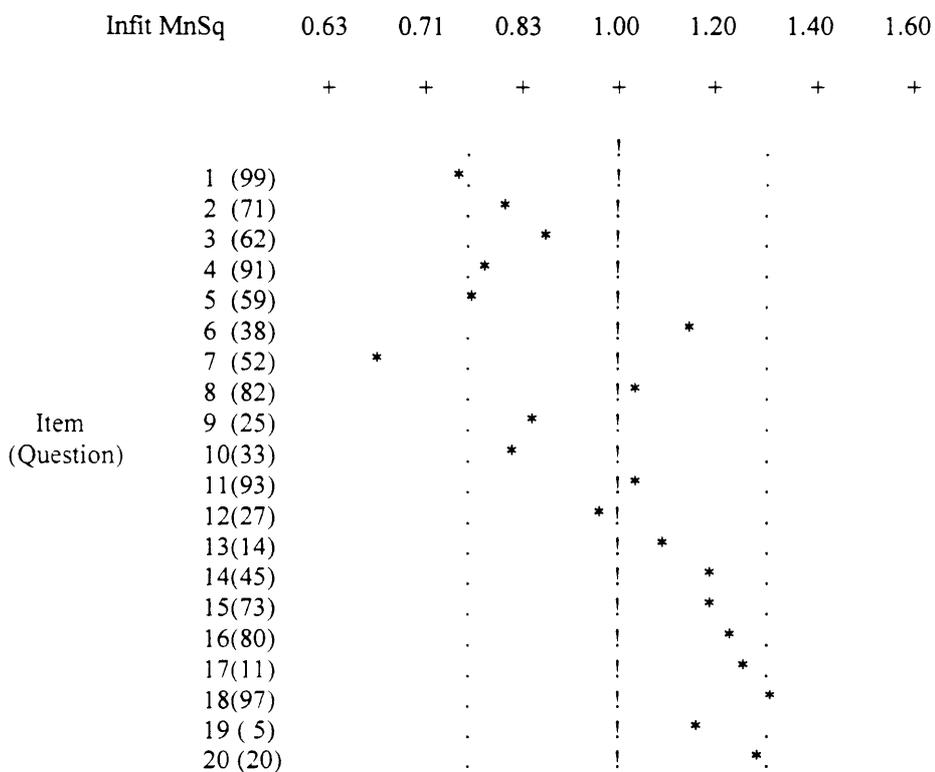


Figure 8. Motivation subscale: mean item fit

Note: Legend -: : = acceptance range; ! = ideal item fit ; * item location

A high level of construct validity was achieved, as there were no items outside the upper acceptance range (See Figure 8). Only one item (7,Q52 – ‘I am interested in conducting research’) displayed a mean square value <0.07 suggesting poor

discrimination by this item between persons with different perception of motivation.

Overall item difficulty for the motivation subscale is reported in Table 35. The most difficult item relating to motivation was item 15 (Q73 – ‘I conduct research because it assists me to be promoted’). The easiest item was item 9 (Q25 – ‘I would conduct research if I had the time’).

Table 35
Motivation Subscale: Mean Overall Item Difficulty.

Order of Difficulty	Item No.	Question No.	Difficulty Level	Item Statement
1	15	73	1.05	I conduct research because it assists me to be promoted
2	17	11	0.63	I will conduct research because assists in promotion
3	19	5	0.63	I put research high on my list of priorities
4	14	45	0.41	I will conduct research .. it benefits positive appraisal
5	3	62	0.20	I would conduct research if I knew how analyse results
6	6	38	0.16	I would conduct research if knew how to write proposal
7	10	33	0.14	I like to conduct research
8	20	20	0.10	Conducting research is not a priority (R)
9	1	99	0.08	I would conduct research if I knew how to access funds
10	16	80	-0.09	Research is most important for improving patient care
11	2	71	-0.11	If research skills&know. become involved in research
12	7	52	-0.12	I am interested in conducting research
13	18	97	-0.22	Advancement of nsg knowledge only through research
14	5	59	-0.27	I would conduct research if more funds available
15	13	14	-0.34	I would conduct research if patient load lightened
16	11	93	-0.40	I have research skills &knowledge not interested (R)
17	4	91	-0.43	I would conduct research if relief time available
18	12	27	-0.45	I would like to conduct a study of a patient care problem
19	8	82	-0.46	I would conduct research if help from someone know.
20	9	25	-0.47	I would conduct research if I had the time

Note: (R) = reverse scored item.

The most difficult category for respondents to agree with in relation to motivation was step 4 in item 15 (Q73) ie. to move from 'agree' to 'strongly agree' that the respondent conducts research because it assists [them] to be promoted. This suggests that promotion is not necessarily strongly linked to the motivation to conduct research. The easiest step is step 1 in item 8 (Q82) that is, move from 'strongly disagree' to 'disagree' for the question ' I would conduct research if someone more knowledgeable would help me through the process'.

Thurstonian thresholds relating to the motivation subscale are located in Figure 9 (p.139). Step 4 for all items are clearly separated from step 3 of all items. Similarly to the knowledge subscale items there was less discrete banding of step 3 and 2 for the motivation subscale. Step 2 for several items being more difficult to achieve than step 3 of other items. A discrete banding for step 1 is evident.

A summary of the tau parameters for each item of the motivation subscale is located in Table 36 (p.140). Step 1 was the easiest to achieve for all items and step 4 for all items the most difficult to achieve.

The item count, percentage and infit mean square for each item in the subscale is located in Appendix G.

Logits Scale	Item and Step				
4.0	15.4				
3.0	1.4	3.4			
	14.4	17.4			
2.0	6.4				
	2.4	10.4	19.4		
	5.4	16.4			
	4.4	7.4	8.4	9.4	12.4
	11.4				
1.0	15.3				
	17.3				
	14.3	19.3			
	1.3	3.3	6.3	15.2	
	10.3	20.3			
	2.3	5.3	16.3	19.2	
	7.3	13.3	17.2		
0.0	4.3	8.3	9.3	11.3	12.3
	3.2	6.2	16.2		
	10.2	18.2			
-1.0	1.2	2.2	7.2		
	5.2	8.2	12.2	13.2	
	4.2	11.2			
	9.2				
	19.1				
-2.0	15.1	17.1			
	10.1				
	7.1	14.1	20.1		
	6.1				
-3.0	2.1	11.1	18.1		
	3.1	13.1	16.1		
	1.1	4.1	5.1	9.1	12.1
	8.1				
-4.0					

Figure 9. Motivation subscale: Thurstonian thresholds

Table 36
Motivation Subscale: Tau Parameters.

Item	Question	Step 1	Step 2	Step 3	Step 4
1	99	- 2.90	- 0.54	0.41	3.04
2	71	- 2.30	- 0.51	0.25	2.56
3	62	- 2.86	- 0.36	0.19	3.03
4	91	- 2.32	- 0.39	0.24	2.47
5	59	- 2.52	- 0.49	0.58	2.42
6	38	- 2.49	- 0.32	0.21	2.59
7	52	- 1.75	- 0.56	0.14	2.17
8	82	- 2.59	- 0.04	- 0.03	2.58
9	25	- 2.26	- 0.61	0.31	2.56
10	33	- 2.01	- 0.58	0.26	2.33
11	93	- 1.96	- 0.41	0.08	2.29
12	27	- 2.43	- 0.09	0.04	2.48
13	14	- 2.35	- 0.45	0.39	2.41
14	45	- 2.57	- 0.01	- 0.01	2.59
15	73	- 2.64	0.11	0.07	2.46
16	80	- 2.53	0.03	0.11	2.39
17	11	- 2.13	- 0.16	0.00	2.29
18	97	- 2.30	0.23	- 0.28	2.35
19	5	- 2.01	0.32	- 0.10	1.79
20	20	- 2.30	0.59	- 0.33	2.04

Note: For item statements declared in the positive:
 Step 1 - movement between 'strongly disagree' and 'disagree'
 Step 2 - movement between 'disagree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'agree'
 Step 4 - movement between 'agree' and 'strongly agree'
 For item statements declared in the negative:
 Step 1 - movement between 'strongly agree' and 'agree'
 Step 2 - movement between 'agree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'disagree'
 Step 4 - movement between 'disagree' and 'strongly disagree'.

The distribution for respondents is displayed in Figure 10. Individuals located to the right of the figure are considered to perceive greater motivation to conduct nursing research than those individuals located at the left. The distribution may be seen to approximate the normal curve.

In summary, the motivation items constitute a valid and reliable subscale and the derived interval scores can be used confidently for further multivariate analyses.

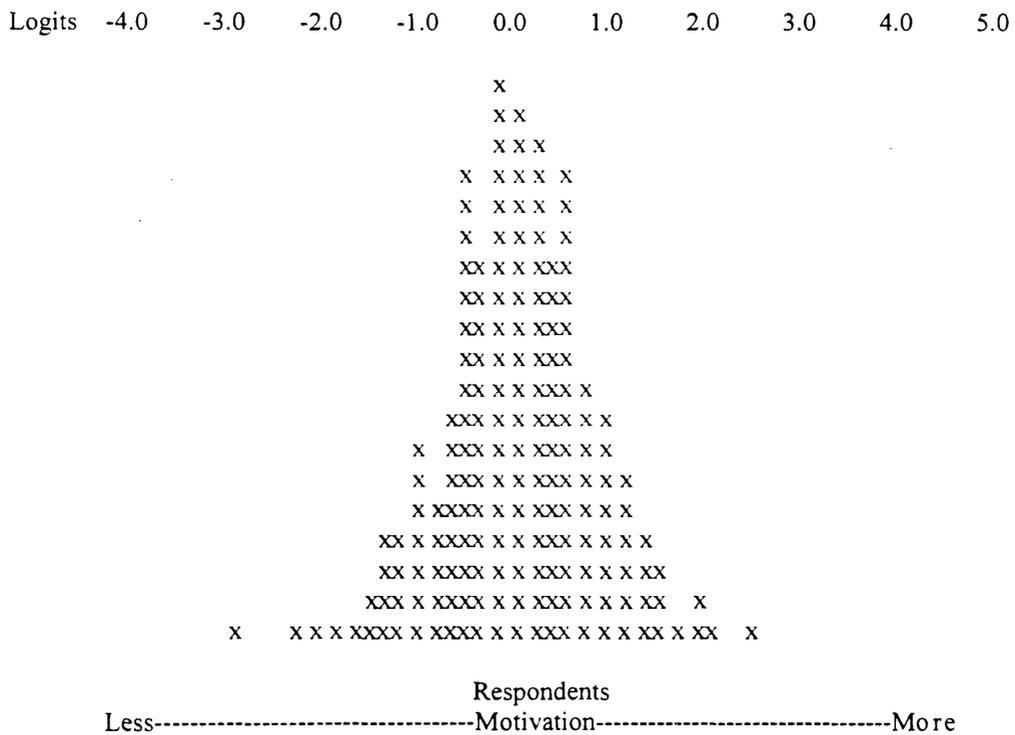


Figure 10. Motivation subscale: respondent distribution

SUPPORT SUBSCALE

The support subscale demonstrated good fit of the data to the model as evidenced by the high item reliability estimate (0.87) and case reliability estimate (0.88) which both exceeded 0.7 (see Table 32 p.127). Infit mean square for items was ideal (1.00) and the case infit mean square close to ideal (1.03). Internal consistency for the subscale (0.88) was well above the minimum level. A high level of construct validity was achieved as there were no outliers beyond the maximum acceptance range (see Figure 11). In addition, there were no items less than 0.7 suggesting that there was good discrimination by the items amongst respondents.

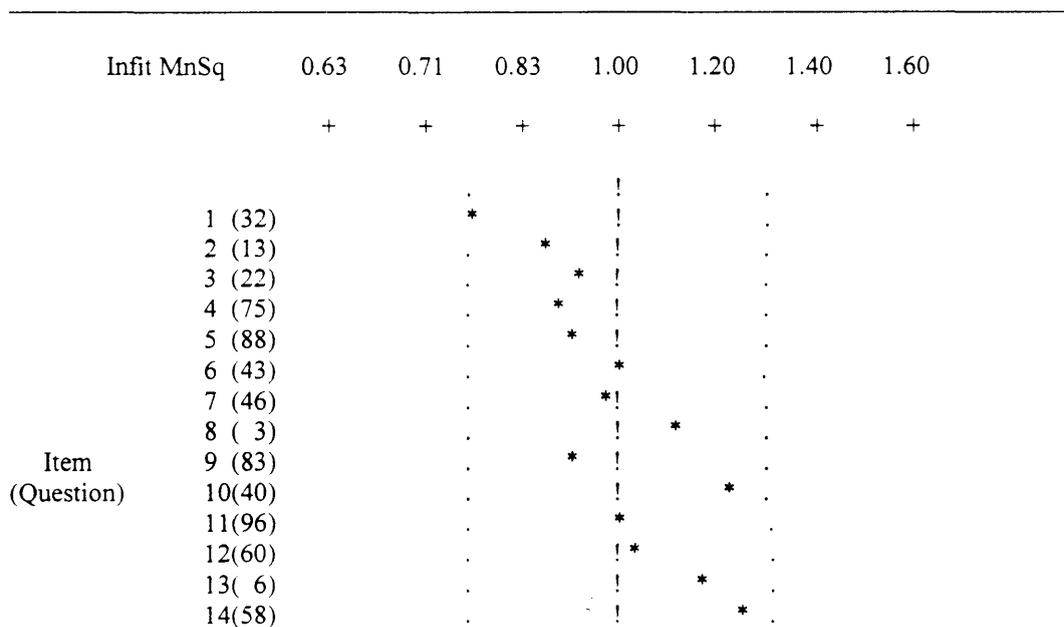


Figure 11. Support subscale: mean item fit

Note: Legend -: = acceptance range; ! = ideal item fit ; * item location

Overall item difficulty for the support subscale is reported in Table 37. The most difficult item was item 10 (Q40 – ‘My place of employment has ample secretarial assistance for anyone wishing to conduct research’). The easiest item was item 14 (Q58 – ‘I would receive praise from my peers and colleagues if I completed a research project’).

Table 37
Support Subscale Overall Mean Item Difficulty.

Order of Difficulty	Item No.	Question No.	Difficulty Level	Item Statement
1	10	40	0. 60	Employer has ample secretarial assistance for research
2	8	3	0. 57	My job provides the time necessary to conduct research
3	7	46	0. 53	My supervisor/s allow me time to conduct research
4	4	75	0. 03	My employer offers ...opportunity to conduct research
5	9	83	-0. 02	My peers in nursing encourage me to conduct research
6	3	22	-0. 02	Employer has ample assistance for analysis of results etc
7	1	32	-0. 05	Employer provides ... assistance to engage in research
8	13	6	-0. 06	I receive praise from my peers when I conduct research
9	12	60	-0. 06	Non-nurses encourage me to conduct research
10	2	13	- 0. 07	My employer has ...consultative assistance for research
11	5	88	- 0. 07	My employer has ... statistical assistance for research
12	11	96	- 0. 13	My peers in nursing assist me to conduct research
13	6	43	- 0. 16	My job provides ongoing education to conduct research
14	14	58	- 1. 09	I would receive praise if I complete research

A summary of the tau parameters is located in Table 38 (p.144). Thurstonian thresholds for the subscale are displayed in Figure 12 (p.145). The most difficult category for respondents to agree with was item 9 step 4 (Q83 – ‘My peers in nursing encourage me to conduct research’). This suggests that for nurses who perceive high levels of support they would also find it easier to strongly agree to peer support for research than other correspondents would with a low score on the

Table 38
Support Subscale: Tau Parameters.

Item	Question	Step 1	Step 2	Step 3	Step 4
1	32	- 2.28	- 0.33	0.32	2.30
2	13	- 1.65	- 0.34	0.03	1.96
3	22	- 1.99	- 0.57	0.51	2.05
4	75	- 2.46	0.15	- 0.01	2.32
5	88	- 2.26	- 0.92	0.89	2.28
6	43	- 2.26	- 0.13	- 0.38	2.52
7	46	- 2.04	- 0.19	0.14	2.09
8	3	- 1.90	- 0.01	- 0.07	1.99
9	83	- 3.02	- 0.12	- 0.09	2.99
10	40	- 1.67	- 0.60	0.56	1.71
11	96	- 2.86	- 0.31	0.12	3.05
12	60	- 2.4	0.08	0.14	2.24
13	6	- 2.01	- 0.66	0.17	2.49
14	58	- 2.59	- 0.95	- 0.50	3.04

Note: For item statements declared in the positive:
 Step 1 - movement between 'strongly disagree' and 'disagree'
 Step 2 - movement between 'disagree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'agree'
 Step 4 - movement between 'agree' and 'strongly agree'
 For item statements declared in the negative:
 Step 1 - movement between 'strongly agree' and 'agree'
 Step 2 - movement between 'agree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'disagree'
 Step 4- movement between 'disagree' and 'strongly disagree'.

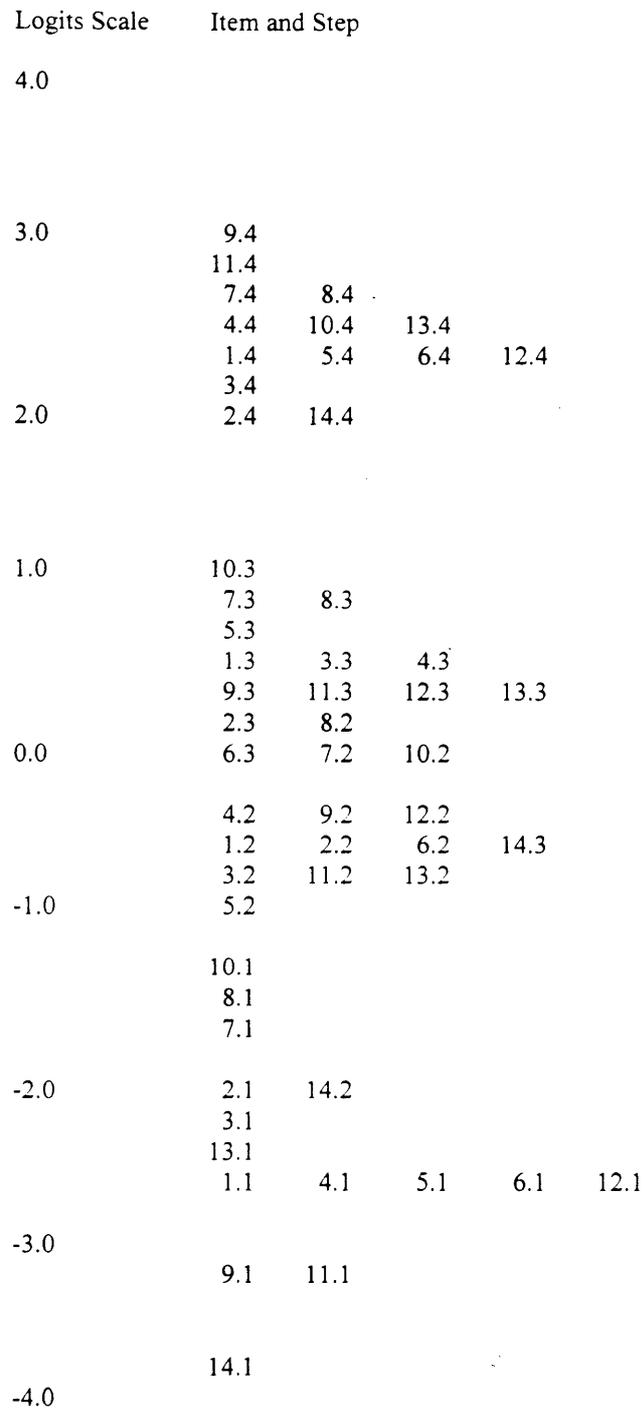


Figure 12. Support subscale: Thurstonian thresholds

support scale. The easiest step for respondents was movement from 'strongly disagree' to 'disagree' in relation to step 1 of item 14 (Q58 –'I would receive praise from my peers and colleagues if I completed a research project').

Clear and distinct banding occurs for step 4 for all items (see Figure12 p.145). The other steps are less discrete in their banding pattern. Agreement with the relative steps for item 14 (Q58 –' I would receive praise from my peers and my colleagues if I completed a research project') appears more readily at the different steps than for other items in the subscale. Step 4 remains the most difficult step for all items in the support subscale.

The item counts, percentage and infit mean square for each item are located in Appendix G.

The distribution for respondents is located in Figure 13 (p. 147). There is a general resemblance to a normal curve with some skew to the left and a longer tail on the left hand side. Individuals of the right hand side perceive greater support than those cases located on the left-hand side.

In summary, the support items constitute a valid and reliable subscale and the derived scores can be used confidently in further multivariate analysis.

the lowest recorded for all subscales but still above the minimum standard of 0.7.

Figure 14 displays the mean item fit for the enactment subscale.

Infit MnSq	0.63	0.71	0.83	1.00	1.20	1.40	1.60
	+	+	+	+	+	+	+
Item				!			
(Question)		*	.	!		.	
1 (77)		.	.	!		.	
2 (8)		.	*	!		.	
3 (94)		.	.	*	!	.	
4 (37)		.	.	*		.	
5 (16)		.	.	!	*	.	
6 (78)		.	.	!	*	.	
7 (68)		.	.	!	*	.	
8 (72)		.	.	!	*	.	
9 (31)		.	.	!	*	.	

Figure 14. Enactment subscale: mean item fit

Note: Legend -: = acceptance range; ! = ideal item fit ; * item location

A high level of construct validity was achieved as there were no items beyond the acceptance range (1.3). There was one item recorded below the minimum acceptance range (<0.7) and that was item 1 (Q77- ‘Nursing research should only be conducted by professional nurse researchers’). This result suggests that this item is a poor discriminator between cases when different perceptions of enactment are held.

Overall item difficulty for the subscale is located in Table 39 (p.149). The most difficult item was the reverse scored item 7 (Q68- ‘Time spent giving patient care is more important than time spent conducting research’). The easiest item was the

reverse scored item 3 (Q94 – ‘Nursing research should only be conducted by nurses with a university degree’).

Table 39
Enactment Subscale: Overall Mean Item Difficulty.

Order of Difficulty	Item No.	Question No.	Difficulty Level	Item Statement
1	7	68	1.54	Time giving pt. Care more important time on research (R)
2	8	72	0.27	Pt. Participation in research difficult to obtain (R)
3	9	31	0.23	All nurses could engage in nursing research
4	5	16	- 0.09	Nsg. Research only initiated by clinical nurses (R)
5	1	77	- 0.16	Nsg. Research only by professional nurse researchers (R)
6	6	78	- 0.17	Informed consent process prevents me from research (R)
7	2	8	- 0.39	Nsg research only by nurse academics (R)
8	4	37	- 0.55	Only non-nurses should conduct research (R)
9	3	94	- 0.69	Nsg. research only by nurses with a university degree (R)

Note: (R) = reverse scored item.

The most difficult category for respondents to agree with was step 4 in item 7 (Q68) ie. Movement from ‘disagree’ to ‘strongly disagree’ in relation to time being spent providing patient care as being more important than time spent conducting research (see Figure 15 p.151). The easiest step difficulty items to achieve were items 6 (Q78 – ‘ The informed consent process for employee participation in research prevents me from conducting research in my work area’) and item 8 (Q72 – ‘Patient participation in nursing research is difficult to obtain’). A summary of the tau parameters for the enactment subscale is located in Table 40 (p.150). Step 4 for all items provided the most difficult step to achieve.

Table 40
Enactment Subscale: Tau Parameters.

Item	Question	Step 1	Step 2	Step 3	Step 4
1	77	- 1.06	- 0.19	- 0.32	2.05
2	8	- 0.14	- 0.22	- 0.69	1.05
3	94	- 1.12	- 0.02	- 0.80	1.94
4	37	- 0.49	0.28	- 1.05	1.27
5	16	- 1.31	- 0.01	- 0.44	1.75
6	78	- 2.02	- 1.82	0.86	2.99
7	68	- 1.90	- 0.21	- 0.57	2.69
8	72	- 2.85	- 0.66	0.24	3.26
9	31	- 1.55	0.06	- 0.39	1.88

Note: For item statements declared in the positive:
 Step 1 - movement between 'strongly disagree' and 'disagree'
 Step 2 - movement between 'disagree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'agree'
 Step 4 - movement between 'agree' and 'strongly agree'
 For item statements declared in the negative:
 Step 1 - movement between 'strongly agree' and 'agree'
 Step 2 - movement between 'agree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'disagree'
 Step 4- movement between 'disagree' and 'strongly disagree'.

Thurstonian thresholds are displayed in Figure 15 (p.151). Discrete banding between each of the steps is not as evident as in other subscales. Step movement for item 7 (Q68 - 'Time spent giving patient care is more important than time spent conducting research') appears more difficult to achieve than for other items. The item counts, percentage and infit mean square for each item in the enactment subscale are located in Appendix G.

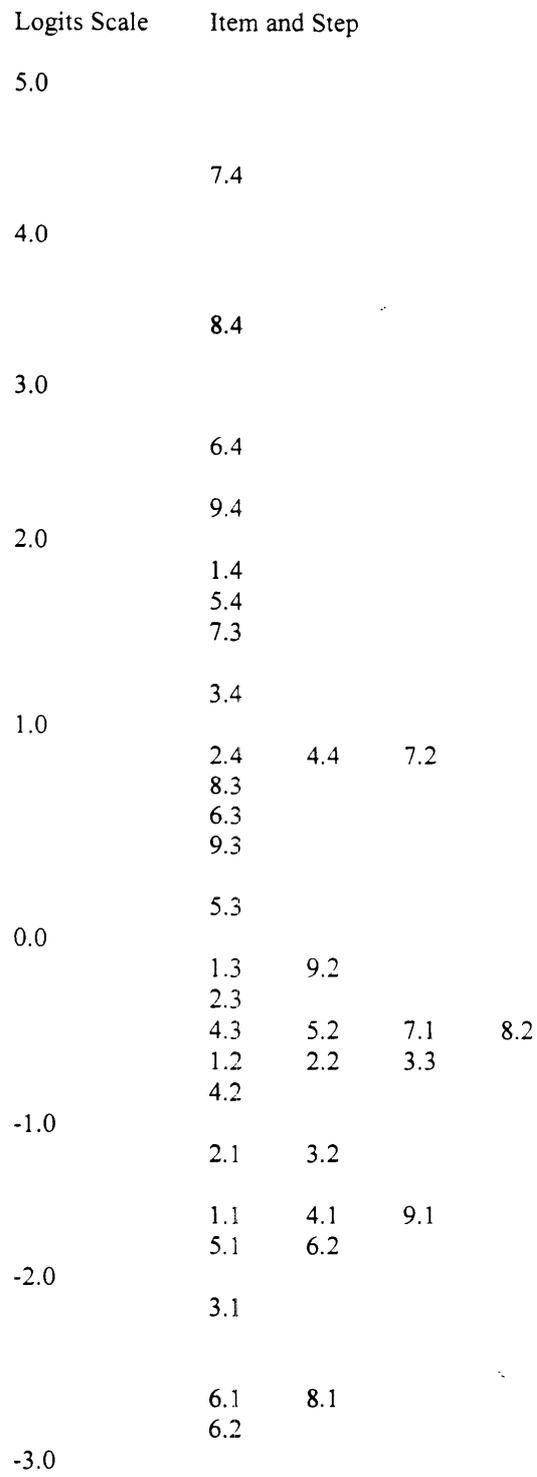


Figure 15. Enactment subscale: Thurstonian thresholds.

The distribution for respondents is displayed in Figure 16. There is a pronounced skew to the right suggesting that the majority of respondents felt more consistently positive about enactment issues.

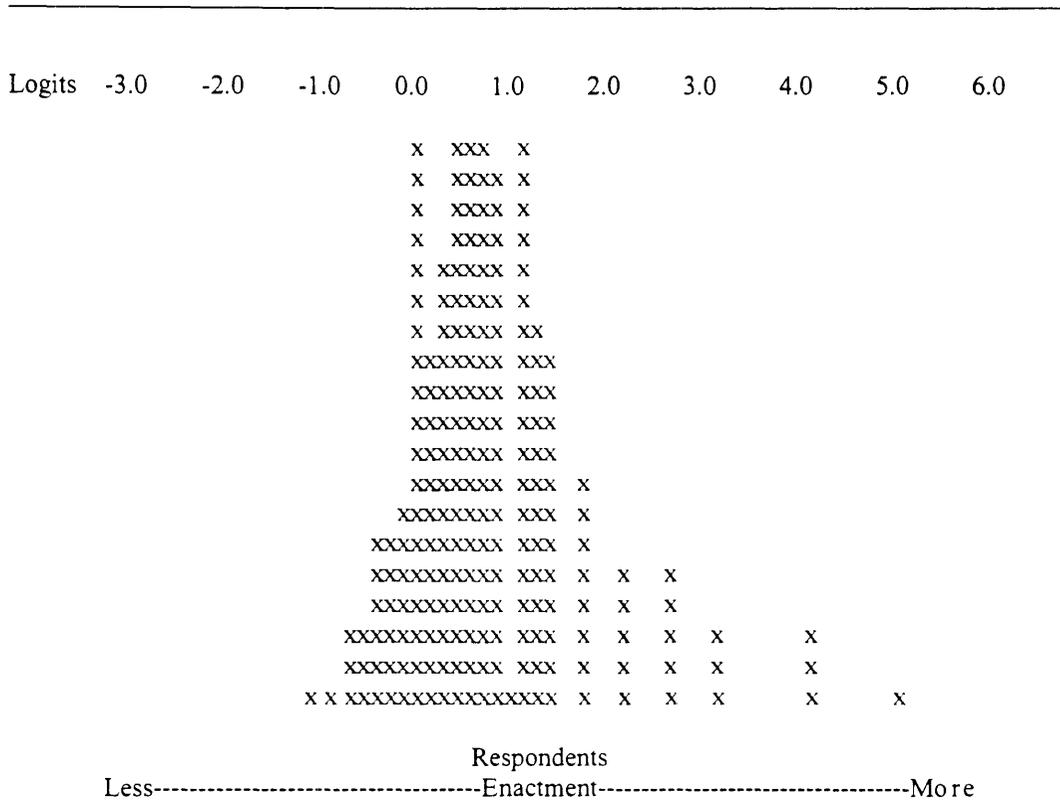


Figure 16. Enactment subscale: respondent distribution

In summary, the enactment items constitute a valid and reliable subscale and the derived equal-interval scores could be utilised confidently for further multivariate analysis.

SELF-ESTEEM SUBSCALE

The self-esteem subscale demonstrated good fit of the data to the model in all aspects excepting item reliability (see Table 32 p.129). The item reliability estimate (0.47) was below the minimum level of 0.7. However, the case reliability estimate was high (0.84) and the infit mean square very close to ideal for item (0.99) and case (1.03). Internal consistency for the subscale remained high (0.86). Figure 17 displays the mean overall item fit for the self-esteem subscale.

Infit MnSq	0.63	0.71	0.83	1.00	1.20	1.40	1.60
	+	+	+	+	+	+	+
Item (Question)				!			
1 (2)				*			
2 (24)				!	*		
3 (49)				!			*
4 (56)				*	!		
5 (63)			*	!			
6 (84)			*	!			
7 (86)		*		!			
8 (87)		*		!			
9 (90)				!		*	
10(98)			*	!			

Figure 17. Self-esteem subscale: mean item fit

Note: Legend -: = acceptance range; ! = ideal item fit ; * item location

Two items exceeded the acceptance range of more than 1.3 logits. Item 3 (Q49 – ‘Usually I do lots of things that are important’) and item 9 (Q90 – ‘Overall nothing I do is very important’) are identified as outliers which may affect the construct validity of the scale. Item 7 (Q86 – ‘Overall, I think I am very accepting of myself’) and item 8 (Q87 – ‘Generally I have positive thoughts about myself’)

were identified as items below the minimum acceptance level. This could mean that these items could have poor discrimination between persons with different perceptions of self-esteem.

Overall item difficulty is reported in Table 41. The most difficult item for respondents was item 2 (Q24 – ‘Usually I lack self confidence’). Item 1 (Q2 – ‘Generally I have a lot of respect for myself’) was found to be the easiest item for respondents.

Table 41
Self-Esteem Subscale: Overall Mean Item Difficulty.

Order of Difficulty	Item No.	Question No.	Difficulty Level	Item Statement
1	2	24	0.58	Usually, I lack self confidence (R)
2	10	98	0.33	Usually, I have a lot of self confidence
3	4	56	0.19	Overall, I am not very accepting of myself (R)
4	3	49	0.19	Usually I do lots of things that are important
5	6	84	- 0.05	... I have pretty negative feelings about myself (R)
6	8	87	- 0.07	Generally, I have positive thoughts about myself
7	9	90	- 0.10	Overall, nothing I do is very important (R)
8	5	63	- 0.14	In general, I don't have much respect for myself (R)
9	7	86	- 0.17	Overall, I think I am accepting of myself
10	1	2	-0.62	Generally, I have a lot of respect for myself

Note: (R) = reverse scored item.

The most difficult category for respondents to achieve was step 4 for item 10 (Q98 – ‘Usually I have a lot of self confidence’ – see also Figure 18 p.156). This suggests that respondents with low levels of self-esteem would be unlikely to respond ‘strongly agree’ to item 10. The easiest step for all cases to achieve was

step 1 ('disagree' to 'strongly disagree') in item 4 (Q56 – 'Overall, I am not very accepting of myself'). The tau parameters (located in Table 42) revealed that step 4 was the most difficult step for respondents to achieve. Thurstonian thresholds for the self-esteem subscale are displayed in Figure 18 (p.156).

Table 42
Self Esteem Subscale Tau Parameters

Item	Question	Step 1	Step 2	Step 3	Step 4
1	2	- 1.92	- 0.63	- 0.59	3.13
2	24	- 2.38	0.74	- 1.32	2.96
3	49	- 2.37	- 0.35	- 1.15	3.86
4	56	- 2.44	0.14	- 0.69	2.98
5	63	- 0.99	- 0.33	- 1.20	2.51
6	84	- 1.62	1.92	- 1.17	2.50
7	86	- 1.67	- 0.47	- 1.27	3.41
8	87	- 1.96	- 0.18	- 1.23	3.37
9	90	- 0.86	- 0.19	- 1.63	2.68
10	98	- 2.97	0.20	- 0.89	3.66

Note: For item statements declared in the positive:
 Step 1 - movement between 'strongly disagree' and 'disagree'
 Step 2 - movement between 'disagree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'agree'
 Step 4 - movement between 'agree' and 'strongly agree'
 For item statements declared in the negative:
 Step 1 - movement between 'strongly agree' and 'agree'
 Step 2 - movement between 'agree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'disagree'
 Step 4 - movement between 'disagree' and 'strongly disagree'.

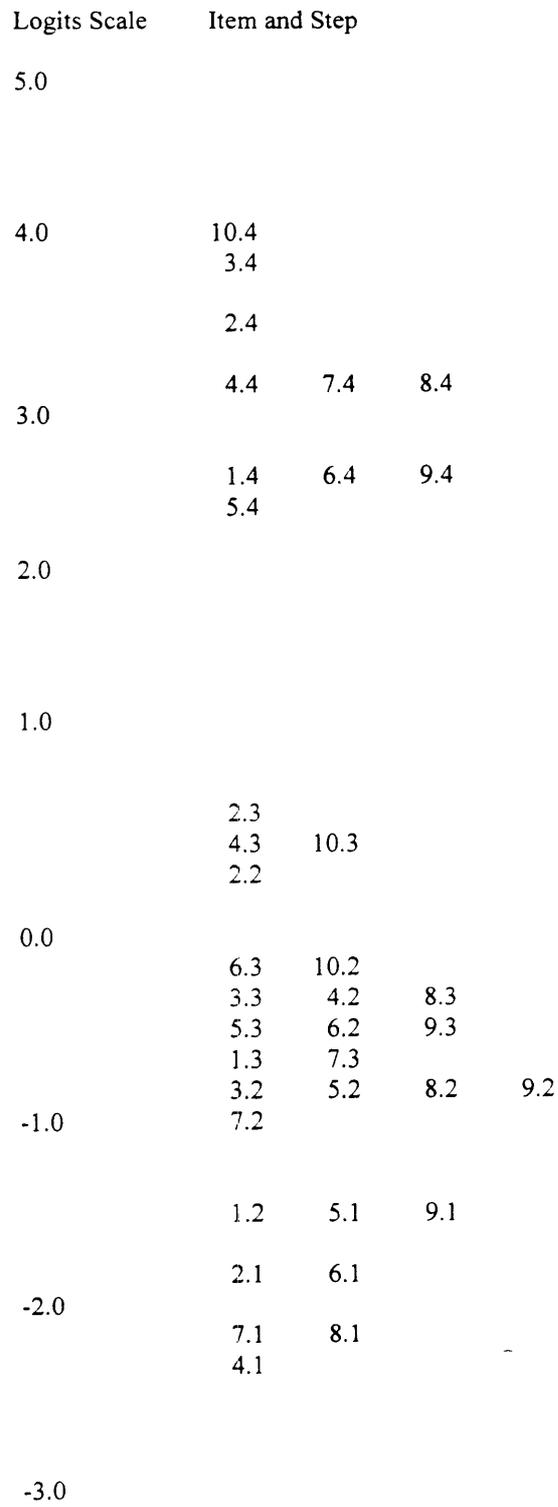


Figure 18. Self-esteem subscale: Thurstonian thresholds.

In summary, the self-esteem items experience some difficulty with construct validity because of the two-outlying items. However, case reliability estimates and internal consistency suggest that this subscale may still be valid and reliable. A possible explanation may be that the subscale has normally been used with adolescent populations and mature individuals may view the items differently. At this stage because of previously established construct validity, the self-esteem subscale will be accepted as valid and reliable with the derived interval level scores able to be used with confidence in further multivariate analysis.

JOB SATISFACTION SUBSCALE

The job satisfaction subscale demonstrated good fit of the data to the model (see Table 32 p.129). The item reliability estimate was very high (0.95) and the case reliability estimate (0.87) was less than 0.7 suggesting a similar item spread if the scale was administered to a similar set of subjects. The item mean square fit (1.01) was very close to ideal, with a similar result achieved for case mean square fit (1.04). Internal consistency for the subscale was very good (0.86).

Only one item was identified outside the upper level of the acceptance range. Item 2 (Q7 – ‘I have too much to do at work’). As this outlying item constitutes less than five percent of the total items, construct validity for the subscale is not considered to be compromised (Chern et al., 1996). Item 10 (Q48 – ‘ I do not feel that the work I do is appreciated’) appears to be a poor discriminator between

respondents with different levels of job satisfaction. A summary of job satisfaction mean item fit is located in Figure 20.

Infit MnSq	0.63	0.71	0.83	1.00	1.20	1.40	1.60
	+	+	+	+	+	+	+
Item				!			
(Question)				!			
1 (1)				!* .			
2 (7)				!			*
3 (10)			*	!			
4 (18)				!	*		
5 (23)			*	!			
6 (29)				*!			
7 (36)				!	*		
8 (41)				!	*		
9 (44)		*		!			
10(48)				!			
11(50)				!	*		
12(54)			*	!			
13(70)				*!			
14(76)				!	*		
15(85)				!* .			
16(89)			*	!			
17(92)				*!			
18(100)				*!			

Figure 20. Job satisfaction subscale: mean item fit.

Note: Legend -: = acceptance range; ! = ideal item fit ; * item location)

Overall item difficulty for the job satisfaction subscale is summarised in Table 43 (p.160). The most difficult item was item 2 (Q7 –‘I have too much too do at work’). The easiest item was item1 (Q1 –‘I feel a sense of pride in doing my job’).

Table 43
Job Satisfaction Subscale: Overall Mean Item Difficulty.

Order of Difficulty	Item No.	Question No.	Difficulty Level	Item Statement
1	2	7	1.41	I have too much to do at work (R)
2	16	89	0.71	When I do a good job I get the recognition I should ...
3	6	29	0.62	There are few rewards for those who work... (R)
4	9	44	0.60	Don't feel my efforts rewarded the way they should (R)
5	7	36	0.56	Too much fighting and bickering at work (R)
6	13	70	0.38	Communication seems quite good in my employment
7	14	76	0.32	Rules and procedures make doing good job difficult (R)
8	5	23	0.25	I am not satisfied with benefits I receive from my job (R)
9	12	54	0.21	I feel unappreciated by my employers (R)
10	10	48	0.16	I do not feel the work I do is appreciated (R)
11	8	41	0.07	Work harder at job because of incompetence of others (R)
12	11	50	- 0.17	My supervisor is quite competent in his/her job
13	4	18	- 0.50	I sometimes feel my job is meaningless (R)
14	17	92	- 0.71	My supervisor is unfair to me (R)
15	3	10	- 0.73	My job is enjoyable
16	15	85	- 0.88	I like the things I do at work
17	18	100	- 1.03	I like the people I work with
18	1	1	- 1.29	I feel a sense of pride in doing my job

Note: (R) = reverse scored item.

The most difficult category for respondents to agree with was step 4 in item 16 (Q89) ie. 'strongly agree' that 'When I do a good job I receive the recognition for it that I should' (see Figure 21 p. 161). Respondents who score low on job satisfaction would be unlikely to respond in that category for that item. The easiest step was to move from step 1 for item 15 (Q85 - 'I like the things I do at work').

Thurstonian thresholds for the job satisfaction subscale are displayed in Figure 21 (p.161). There is no absolute discrete banding of the steps across the items. In

Logits Scale	Item and Step				
4.0	16.4				
	2.4				
3.0	9.4	14.4			
	13.4				
	6.4				
	5.4	12.4			
2.0	7.4	10.4			
	8.4				
	11.4				
1.0	3.4	15.4	18.4		
	2.3				
	17.4				
0.0	2.2	4.4			
	9.3				
	6.3	16.3			
	1.4	7.3			
	5.3	6.2	7.2	13.3	
	10.3	12.3	14.3	16.2	
	8.3	9.2			
	5.2	13.2			
	8.2	10.2	11.3	12.2	14.2
	4.3				
-1.0	2.1	4.2			
	11.2				
	17.3				
	3.3				
	17.1	15.3			
	6.1	17.2	18.3		
	1.3	3.2			
	11.1	15.2			
	1.2	8.1	12.1	13.1	18.2
	5.1	9.1	10.1	16.1	
-2.0	17.1				
	3.1	4.1	14.1		
	15.1				

Figure 21. Job satisfaction subscale: Thurstonian thresholds.

general, step 4 for most items is the most difficult step. However step 3 for item 2 (Q7 – ‘ I have too much work to do at work’) is more difficult to achieve than step 4 for the items 17 (Q92 – ‘My supervisor is unfair too me’), 4 (Q18 – ‘I sometimes feel a sense of pride in doing my job’). Similarly, there is a degree of overlap in difficulty levels between step 3, step 2 and step 1 of several items. Steps in item 2 (Q7) are consistently the most difficult to achieve. All steps in item 15 (Q85 – ‘ I like the thing I do at work’) are much easier to achieve than other items.

A summary of the results for the within step comparisons (tau parameters) for each item is reported in Table 44 (p.163). Step 4 was the most difficult step to achieve for all items. Steps 1, 2 and 3 are varied in their difficulty to achieve.

The item counts percentages and infit mean squares for the job satisfaction subscale items are located in Appendix G.

The distribution for respondents is displayed in Figure 22 (p.164). The distribution approximates a normal curve. Individuals located at the right of the figure could be seen to possess a higher level of job satisfaction than those respondents located on the left.

In summary, the job satisfaction items constitute a valid and reliable subscale and derived scores can be used confidently in further multivariate analyses.

Table 44
Job Satisfaction Subscale: Tau Parameters.

Item	Question	Step 1	Step 2	Step 3	Step 4
1	1	- 0.96	- 0.69	- 1.43	1.70
2	7	- 1.86	0.50	- 0.96	2.32
3	10	- 0.81	- 0.48	- 0.85	2.14
4	18	- 1.59	1.40	- 1.27	1.46
5	23	- 2.00	- 0.53	- 0.85	2.32
6	29	- 1.78	0.50	- 0.79	2.07
7	36	- 1.53	0.91	- 1.36	1.98
8	41	- 1.58	0.68	- 1.15	2.04
9	44	- 2.31	0.04	- 0.50	2.76
10	48	- 1.84	0.36	- 0.90	2.38
11	50	- 1.08	-0.12	- 0.73	1.94
12	54	- 1.77	0.13	- 0.70	2.35
13	70	- 1.96	0.25	- 0.93	2.64
14	76	- 2.35	0.30	- 0.94	2.99
15	85	- 1.18	0.15	- 1.39	2.42
16	89	- 2.45	0.26	- 0.94	3.13
17	92	- 0.81	- 0.28	- 0.81	1.90
18	100	- 1.27	- 0.21	- 1.03	2.52

Note: For item statements declared in the positive:
 Step 1 - movement between 'strongly disagree' and 'disagree'
 Step 2 - movement between 'disagree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'agree'
 Step 4 - movement between 'agree' and 'strongly agree'
 For item statements declared in the negative:
 Step 1 - movement between 'strongly agree' and 'agree'
 Step 2 - movement between 'agree' and 'uncertain'
 Step 3 - movement between 'uncertain' and 'disagree'
 Step 4- movement between 'disagree' and 'strongly disagree'.

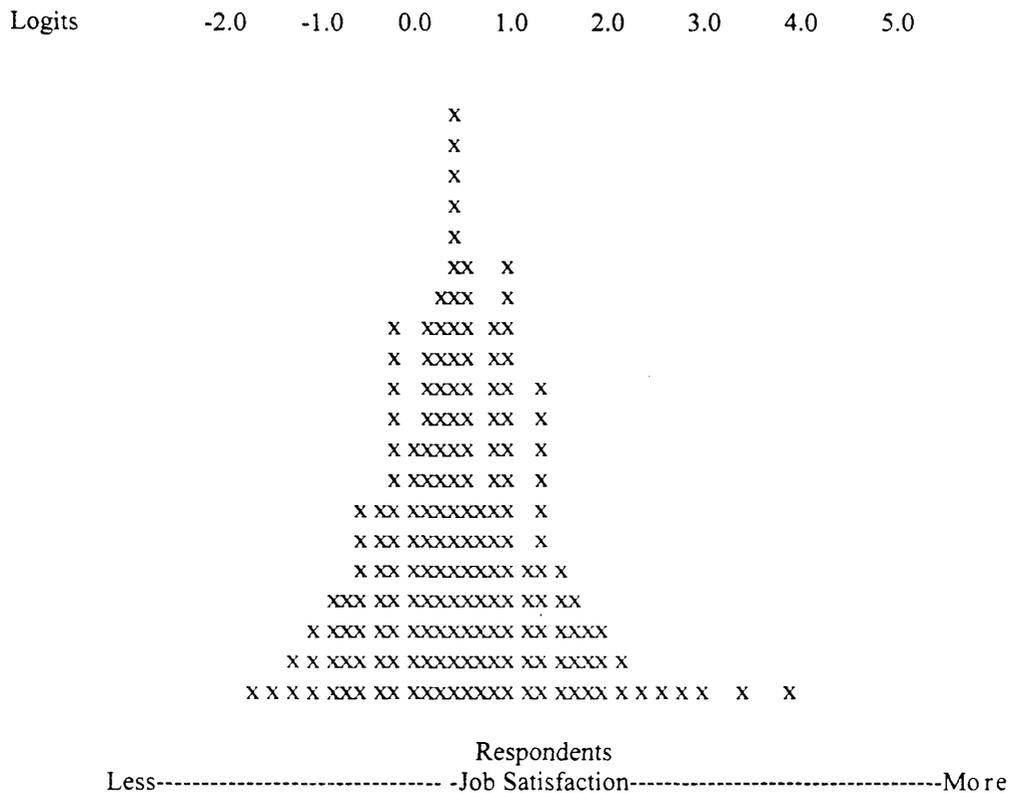


Figure 22. Job satisfaction subscale: respondent distribution.

7.0 TESTING THE MODEL.

Factor analysis facilitated the construction of a model relating to attitudes to nursing research that is comprised of four major factors: *knowledge* and skills related to nursing research; *motivation* to participate in research activity; *support* for research being present or absent; and *enactment* into research activity by all nurses, particular types of nurses, and access to subjects. However, factor analysis only accounted for 43 percent of the variance and Rasch analysis was conducted to provide an alternative solution based on probability of responses. The Rasch

analysis confirmed that the subscales derived from the factors were of good fit suggesting that a similar pattern of response to the items could be expected if the subscales were used again with a similar set of respondents (registered nurses). Rasch analysis also afforded the opportunity to build into the model two further variables: *self-esteem* and *job satisfaction*. There was good fit of the data to the Rasch model for job satisfaction. In general, self esteem also fitted the model. Thus the final study model to be tested consisted of the aforementioned six subscales (*knowledge, motivation, support, enactment, self esteem* and *job satisfaction*).

Rasch analysis also provided an opportunity to create equal interval scores for the essentially ordinal level data through probabilistic transformation. This has allowed for the construction of specific scores for each case for each of the six subscales. These scores became the basis for further testing of the model through multivariate procedures such as multiple regression and multiple analysis of variance (Manova).

MULTIPLE REGRESSION

Multiple regression analysis is a general statistical technique used to analyse the relationship between a single dependent variable and several independent variables (Hair et al., 1995; Tabachnick & Fidell, 1996). The objective of multiple regression analysis is to use the known values of the independent variables to predict a single dependent value (the variate). The variate is a linear combination

of the independent variables that best predicts the dependent variable. During the process, the variables are standardised and their weighting denotes their relative contribution to the overall prediction (Hair et al., 1995).

Regression analysis has two requirements before it can be utilised. First, the variables must be able to be divided into independent and dependent variables. Second, the data must be metric or appropriately transformed (Hair et al., 1995).

In this investigation, Rasch analysis has provided metric scores (equal interval) for the subscales. Multiple regression analysis could occur by examining each subscale as a dependent variable and the remaining five subscales as the independent variables to determine the relationships between the variables.

The conceptual model that has been presented suggested that the factors (*knowledge, motivation, support and enactment*) contributed to an overall attitude to nursing research that was made up of a combination of these factors. Similarly, *self esteem* and *job satisfaction* were proposed to affect the attitude to nursing research (that is comprised of the nurse's level of *knowledge* and skills relating to the research process; the *motivation* to be involved in nursing research, the nurse's perception of *support* for research activity; and their perception of access or participation in terms of *enactment* in nursing research). The initial proposal was to assess the significance of the subscale *motivation* as the dependent variable and the other subscales as independent variables in the regression analysis. *Motivation*

was selected as it was composed of a variety of items gleaned from most of the original elements. *Motivation* to appreciate or be involved in research was also seen by the investigator to be the pivotal dimension in the construct of ‘*attitude to nursing research*’ (see Table 45).

Table 45
Regression Coefficients with Motivation as Dependent Variable.

Independent Variable	Regression Coefficient	Standard Error	Standardised Regression Coefficient	t-value	p-value
Knowledge	0.003	0.015	0.017	0.601	0.004
Support	0.004	0.012	0.003	0.056	0.955
Enactment	0.015	0.017	0.025	0.889	0.374
Self-esteem	0.003	0.003	0.012	0.409	0.682
Job satisfaction	-0.175	0.101	-0.049	-1.735	0.083

Note: Regression characteristics
 $R = 0.057$ $R^2 = 0.003$ Adjusted $R^2 = 0.001$ $F = 0.861$ $n = 1304$

The results indicate that a relationship failed to be associated and in an attempt to determine if other variables formed the true dependent and independent variables, further analyses using varying configurations of all the factors were conducted using each of the factors (in turn) as the dependent variable and the remaining five factors (as independent variables) added stepwise to determine if any significant relationship could be established.

There was no adequate solution using any of the four nursing attitude subscales (*knowledge, support or enactment*) as the dependent variable with the others (including *motivation, self-esteem and job satisfaction*) as independent variables.

The best solution was achieved with *self-esteem* as the dependent variables and the other five subscales as independent variables (see Table 46). However this was still inadequate as not all subscales achieved a level of significance and conceptually it did not fit the original model proposed.

Table 46
Regression Coefficients with Self-Esteem as Dependent Variable

Independent Variable	Regression Coefficient	Standard Error	Standardised Regression Coefficient	t-value	p-value
Knowledge	0.512	0.086	0.160	5.938	<0.001
Motivation	0.068	0.167	0.011	0.409	0.682
Support	0.272	0.071	0.103	3.833	<0.001
Enactment	0.011	0.101	0.003	0.107	0.915
Job satisfaction	3.704	0.598	0.167	6.193	<0.001

Note: Regression characteristics
 $R = 0.258$ $R^2 = 0.066$ Adjusted $R^2 = 0.063$ $F = 18.474$ $n = 1304$

The use of multiple regression analyses has failed to support the proposed model as there is no discrete inter-relationship between all of the variables. One of the

reasons for this may be the heterogeneity of the sample; there may be homogenous subgroups within the sample. Therefore, the existence of any differences will need to be detected using an alternative method of analysis – multivariate analysis of variance (Manova).

MANOVA

Manova is a statistical technique that attempts to measure the differences for two or more metric (continuous) variables based on a set of categorical predictor variables. It is used to assess the statistical significance of differences between groups (Hair et al., 1995; Tabachnick & Fidell, 1996).

Hair et al. (1995) discusses three major benefits of the Manova procedure. First, the capacity to control for Type 1 error (experiment-wide error rate) that may emerge with the use of separate one-way analyses of variance (Anova). Second, Manova can be used to detect differences among combinations of dependent variables. This search for differences between dependent variables is ignored by the Anova procedure. Third, the procedure provides an economic, single method for testing a wide range of different multivariate questions or hypotheses.

For Manova to occur large sample sizes are necessary. Cell numbers must exceed the number of dependent variables being examined. This may require the collapse of certain cells to achieve this end (Hair et al., 1995). In the context of this study, despite the large overall sample size, certain predictor variables could not be used

because cell numbers were too small. Other variables (*age, major area of practice, educational qualifications and qualifications in progress*) were collapsed to provide the necessary cell numbers.

Manova is very sensitive to outliers and these can affect the Type 1 error rate. Hair et al. (1995) recommends the data set is scrutinised for outliers and these are eliminated from the analyses. For this reason, respondents with perfect scores for any of the subscales were removed from the analyses.

There are several options for significance testing available within most computerised Manova programs. The most widely used is the Wilks lambda (also known as the U statistic or maximum likelihood criterion). Wilks lambda examines whether groups are somehow different without being concerned with whether they differ on at least one linear combination of the dependent variables. The larger the between groups multivariate dispersion, the smaller the value of Wilks lambda and the greater, the implied significance. If the Manova statistic is significant then the univariate statistic (Anova) is examined for significant differences and the results interpreted (Hair et al., 1995).

A number of multivariate analyses of variance were carried out using the case (respondent) estimates produced by the Rasch scaling on the six subscales as dependent variables (*knowledge, motivation, support, enactment, self-esteem and job satisfaction*) and *age, years of professional nursing experience, major area of*

practice (Set 1), and *basic nurse training type, highest educational qualification and educational qualifications in progress or continuing education* (Set 2) as the independent variables. In both sets, levels of the independent variables were collapsed so that cell frequencies were sufficient to estimate set coefficients.

Assumptions of univariate and multivariate normality were tested by visual inspection of normal probability plots and found to be satisfactory. Similarly, Bartlett's test of sphericity indicated that the dependent variable had an appropriate level of intercorrelation. Box's M-test of homogeneity of variance/covariance matrices indicated that in this respect, the groups formed by the independent variables in both sets had no significant differences ($p=0.05$).

The first set examined *age, major area of practice and years of professional nursing experience* with the subscales *knowledge, motivation, support, enactment, self-esteem and job satisfaction*. A significant result was seen at the <0.05 level for *major area of practice* (see Table 47 p.172). There was no significant effect observed for interactions occurring between possible combinations of *age, major area of practice, or years of professional nursing experience*.

The second set examined *basic training type, highest educational qualification and continuing education (education qualification in progress)* with the same aforementioned subscales. There was a significant result for *highest education and continuing education* at the <0.001 level (Table 47 p.172).

A significant effect was observed at the <0.05 level for the interaction between *type of basic nurse training and continuing education*. The interaction between *continuing education and highest educational qualification* was also observed at the <0.005 level.

Table 47.
Multivariate Analyses Result

Variable	Wilks lambda	F-value	df	p value
Set 1				
Age (A)	0.983	1.736	12, 2462	<0.053
Major Area of Practice (M)	0.986	2.891	6, 1231	$<0.008^*$
Experience (E)	0.990	1.983	6, 1231	<0.065
Interactions:				
A x M	0.991	0.965	12, 2462	<0.480
A x E	0.990	1.029	12, 2462	<0.418
M x E	0.999	0.263	6, 1231	<0.954
A x M x E	0.988	1.207	12, 2462	<0.271
Set 2				
Basic Nurse Training (T)	0.995	1.106	6, 1226	<0.357
Continuing Education (C)	0.965	3.702	12, 2452	$<0.001^*$
Highest Education (H)	0.954	4.865	12, 2452	$<0.001^*$
Interactions:				
T x C	0.983	1.807	12, 2452	$<0.042^*$
T x H	0.985	1.545	12, 2452	<0.101
C x H	0.962	1.967	24, 4278	$<0.003^*$
T x C x H	0.990	0.680	18, 3468	<0.834

Note: * denotes significant results

Univariate analysis was scrutinised for the significant multivariate results to determine the effect on each subscale for the relevant variable (see Tables 48-53 pp. 173-178).

A significant result was seen at the <0.05 level for *major area of practice* and *knowledge* variable. A further significant affect was observed at the <0.001 level for the *enactment* variable in relation to *major area of practice* (see Table 48).

Table 48
Univariate Analysis: Major Area of Practice.

Variable	F-value	df	p value
Knowledge	5.269	1, 1248	<0.021 *
Motivation	0.894	1, 1248	<0.344
Support	3.237	1, 1248	<0.072
Enactment	13.917	1, 1248	<0.001 *
Self-esteem	0.521	1, 1248	<0.470
Job satisfaction	1.755	1, 1248	<0.185

Note : * denotes significant result

The cells for the analysis of *major area of practice* had been collapsed into two major groups: Group 1 was labelled the ‘clinicians’, as these were nurses who indicated they worked directly in the clinical arena. ‘Non-clinicians’ (nurses who worked in administration, education, research or those nurses who indicated they worked in a combination of positions and had no major area of practice) constituted Group 2. The mean, standard deviation and standard error for the significant variables arising from univariate analysis is displayed in Table 49 p.174).

Non-clinicians were seen to have a greater level of knowledge and skill relating to nursing research according to the transformed Rasch analysis scores for the *knowledge* subscale (M=0.528; SD=1.275) than the clinician group (M= -0.203; SD=1.089).

Major area of practice also had a significant effect at the <0.001 level for the subscale *enactment*. Non-clinicians were more likely to believe in greater access to participation in nursing research for all nurses (M=1.227; SD=1.076) than the clinician group (M=0.604; SD=0.833).

Table 49
Group Mean and Standard Deviation for Significant Major Area of Practice Variables.

Group Membership	n	M	SD
Knowledge			
Clinicians	1023	- 0.203	1.089
Non-clinicians	225	0.528	1.275
Enactment			
Clinicians	1023	0.604	0.833
Non-clinicians	225	1.227	1.076

Educational qualifications in progress (continuing education) were also seen to affect three of the four nursing attitude subscales (see Table 50 p.175).

Table 50
Univariate Analysis: Continuing Education.

Variable	F-value	df	p value
Knowledge	10.145	2, 1248	<0.001 *
Motivation	3.208	2, 1248	<0.041 *
Support	0.573	2, 1248	<0.471
Enactment	10.533	2, 1248	<0.001 *
Self-esteem	1.337	2, 1248	<0.263
Job satisfaction	0.189	2, 1248	<0.828

Note : * denotes significant result

Categories of *continuing education qualifications* had been collapsed into three groups. Group 1 (No Study) contained those nurses who had indicated that they were not currently pursuing any additional qualifications. Group 2 (PB Studies) included those nurses who were pursuing postbasic certificates or diploma/degree conversion programs. Group 3 (PG Studies) were nurses who were undertaking higher educational studies that included enrolment in honours or post graduate studies such as postgraduate diplomas, master's level or doctoral studies.

Table 51 (p.176) displays the mean and standard deviation for the subgroups for the significant variables. *Continuing education* affected the *knowledge* subscale at the <0.001 level.

Group 3 nurses who were engaged in higher level postgraduate studies demonstrated the greatest amount of knowledge and skill in relation to nursing research (M=1.029; SD=1.200). Nurses who were not currently undertaking any

further educational studies (Group 1) demonstrated the least knowledge and skill (M= -0.329; SD= 1.028).

Table 51
Group Mean and Standard Deviation for Significant Continuing Education Variables.

Group Membership	n	M	SD
Knowledge			
No Study	802	- 0.329	1.028
PB Study	303	0.094	1.137
PG Study	143	1.029	1.200
Motivation			
No Study	802	- 0.012	0.920
PB Study	303	0.290	0.912
PG Study	143	0.618	0.897
Enactment			
No Study	802	0.565	0.828
PB Study	303	0.811	0.899
PG Study	143	1.364	1.082

Nurses engaged in honours or higher level post graduate studies (Group 3) were more motivated to be involved in nursing research (M=0.618; SD=0.897) than nurses currently undertaking post basic certificates or degree/diploma conversion programs (M=0.290;SD=0.912). The least motivated to be active in nursing research were the nurses currently not studying (Group 1: M= -0.012; SD=0.920).

Group 3 nurses engaged in honours or higher level postgraduate studies had the strongest perception of access and participation in nursing research (M=1.364; SD=1.082). Nurses undertaking degree/diploma conversions or postbasic

certificates had less perception of access and participation for nurses in nursing research (M=0.811; SD=0.899). Group 1 nurses who were currently not undertaking any further educational studies had the least perception of access to participation in nursing research (M=0.565; SD=0.828).

Highest educational qualification was found to significantly affect all four of the nursing attitude subscales. However, self-esteem and job satisfaction subscales were unaffected by highest educational qualification of the respondent (see Table 52).

Highest educational qualifications were grouped into three categories. Group 1 (Certificate) nurses held only the basic nursing certificate. Group 2 (PB Level) nurses had completed post basic certificate or diploma programs. Nurses who had completed a degree, honours, master's program or doctoral studies were allocated into Group 3 (UG/PG level).

Table 52
Univariate Analysis: Highest Educational Qualification.

Variable	F-value	df	p value
Knowledge	21.743	2, 1248	<0.001 *
Motivation	6.953	2, 1248	<0.001 *
Support	3.930	2, 1248	<0.019 *
Enactment	3.246	2, 1248	<0.039 *
Self-esteem	1.164	2, 1248	<0.313
Job satisfaction	1.252	2, 1248	<0.286

Note : * denotes significant result

The mean and standard deviations for the four significant variables affected by highest educational qualification are displayed in Table 53.

Table 53
Group Mean and Standard Deviation for Significant Highest Educational Qualification Variables.

Group Membership	n	M	SD
Knowledge			
Certificate Level	639	- 0.536	1.022
PB Level	273	- 0.056	0.953
UG/PG Level	336	0.802	1.048
Motivation			
Certificate Level	639	0.002	0.937
PB Level	273	0.108	0.851
UG/PG Level	336	0.404	0.959
Support			
Certificate Level	639	- 0.735	0.929
PB Level	273	- 0.667	1.007
UG/PG Level	336	- 0.497	1.146
Enactment			
Certificate Level	639	0.519	0.847
PB Level	273	0.678	0.900
UG/PG Level	336	1.124	0.918

Nurses who had completed an honours or higher level postgraduate qualification (Group 3) had the greatest levels of knowledge and skill relating to nursing research (M= 0.802; SD=1.048). Group 1 (certificate qualified only) nurses had the least knowledge (M= -0.536; SD=1.022).

Similarly, nurses who had completed postgraduate higher education studies or honours (Group 3) were more motivated and perceived less barriers to engagement in nursing research ($M=0.404$; $SD=0.959$) than those nurses who had only completed associate diplomas or postbasic certificates (Group 2: $M=0.108$; $SD=0.851$). Group 1 nurses who only held the basic nursing certificate were the least motivated and perceived more barriers to their involvement in nursing research ($M=0.002$; $SD=0.937$).

On average, all nurses perceived poor levels of support for nursing research, although significant differences were apparent. Group 3 nurses who had completed honours or postgraduate studies acknowledged awareness for the highest level of support for the conduct of nursing research ($M= -0.497$; $SD=1.146$). The perception of least support availability to facilitate nursing research was held by the Group 1 certificate only nurses ($M= -0.735$; $SD=0.929$).

The strongest belief in access to participation in nursing research (enactment) was held by Group 3 nurses ($M= 1.124$; $SD=0.918$). Nurses who had not completed higher level postgraduate studies (Group 2) had a reduced perception of enactment ($M=0.678$; $SD=0.900$). Certificate qualified nurses had the poorest perception relating to enactment in nursing research ($M=0.519$; $SD=0.847$)

Table 47 (p. 172) revealed that there were two significant interactions within the variables. The interactions occurred between the *type of training* and *continuing*

education (at the <0.05 level) and also between *continuing education* and *highest qualification* held by respondents (at the <0.005 level). Univariate analysis and the interaction plots for the two groups of interacting variables are displayed in Tables 54-57 (pp. 180-182) and Figures 23 to 24 (pp. 181-183).

Table 54
Univariate Analysis: Interaction Between Basic Nurse Training and Continuing Education.

Variable	F-value	df	p value
Knowledge	0.070	2, 1248	0.932
Motivation	0.274	2, 1248	0.761
Support	2.444	2, 1248	0.087
Enactment	2.383	2, 1248	0.093
Self-esteem	1.903	2, 1248	0.149
Job satisfaction	3.701	2, 1248	0.025 *

Note : * denotes significant result

Table 55
Group Mean and Standard Deviation Scores for Significant Interaction Between Nurse Training Type and Continuing Education : Job Satisfaction.

Group Membership	n	M	SD
Hospital x No Study	632	0.479	0.777
Hospital x PB Study	229	0.316	0.786
Hospital x PG Study	117	0.592	0.745
University x No Study	170	0.324	0.760
University x PB Study	74	0.321	0.727
University x PG Study	26	0.184	0.837

Table 54 (p. 180) reveals that only the job satisfaction subscale was significant ($p < 0.05$) for the interaction between basic nurse training type and continuing education. Group means, standard deviations and standard error for the significant variable are displayed in Table 55 (p. 180).

Job satisfaction whilst positive for all nurses was varied depending on type of nurse training program and further education being studied (see Figure 23).

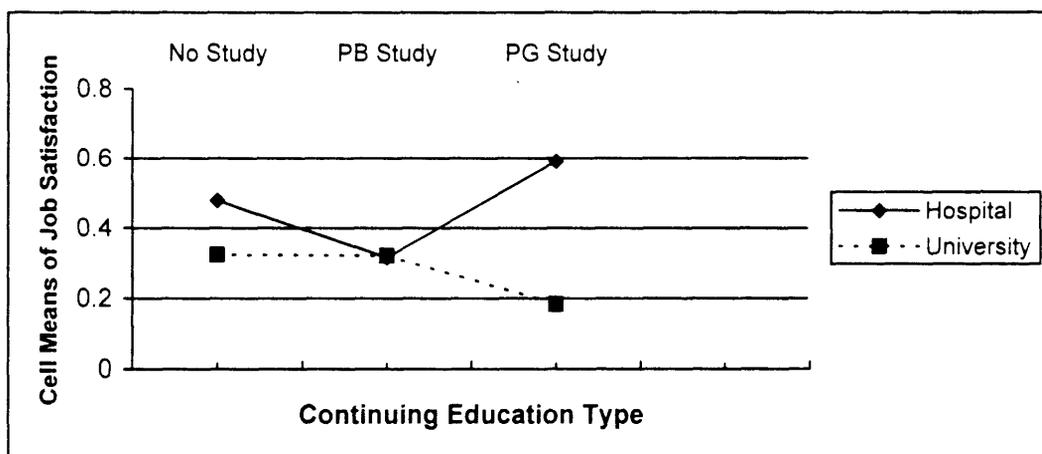


Figure 23. Interaction plot for basic nursing training type and continuing education and job satisfaction subscale.

University-trained nurses not undertaking current further education had a lower level of job satisfaction than hospital trained nurses also not involved in any further study. Whilst the level of job satisfaction remained similar for university nurses who were engaged in postbasic education programs, hospital trained nurses experienced less job satisfaction when engaged in postbasic certificate or

degree/diploma conversion programs. Level of job satisfaction increased considerably for hospital trained nurses undertaking higher level postgraduate studies. University trained nurses engaged in similar higher level educational study experienced relatively less job satisfaction.

The interactions between highest educational qualification and continuing education with the six subscales revealed only the knowledge subscale as significant ($p=0.035$). See also Tables 56 and 57 (p.182-183).

Table 56
Univariate Analysis: Interaction Between Continuing Education and Highest Educational Qualification.

Variable	F-value	df	p value
Knowledge	2.596	4, 1248	0.035 *
Motivation	2.220	4, 1248	0.065
Support	1.855	4, 1248	0.116
Enactment	2.256	4, 1248	0.061
Self-esteem	0.672	4, 1248	0.612
Job satisfaction	1.130	4, 1248	0.341

Note : * denotes significant result

Continuing education cell groups remained as previously mentioned. Group 1 of the highest educational qualification group included those nurses who had only achieved certificate status. Nurses who had completed postbasic certificate/s or associate diploma level studies were allocated to group 2. Group 3 comprised those nurses who had received a degree, graduated with honours or had completed a higher level postgraduate course including masters or doctoral studies.

Table 57
Group Mean and Standard Deviation Scores for Significant Interaction Between Highest Educational Qualification and Continuing Education.

Group Membership	n	M	SD
Knowledge			
Certificate Level x No Study	449	-0.742	0.872
Certificate Level x PB Study	170	-0.235	0.811
Certificate Level x PG Study	183	0.599	0.935
PB Level x No Study	173	-0.068	1.199
PB Level x PB Study	85	0.229	1.074
PB Level x PG Study	45	0.458	0.880
UG/PG Level x No Study	17	0.145	0.926
UG/PG Level x PB Study	18	0.290	1.199
UG/PG Level x PG Study	108	1.291	1.127

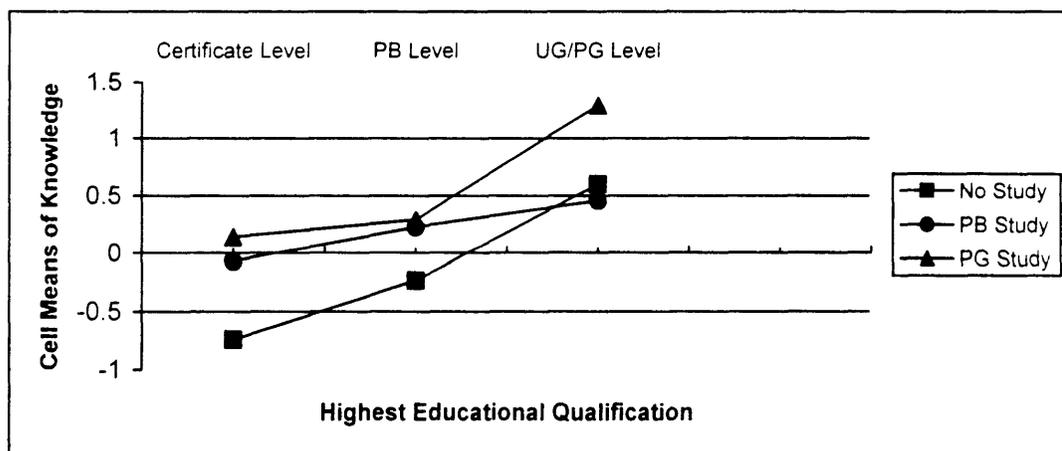


Figure 24. Interaction plot for continuing education and highest educational qualification with knowledge subscale.

Nurses who had achieved only a certificate level of study and were not currently undertaking any further education had the lowest level of knowledge and skills relating to nursing research (see Figure 24 p.183). Nurses who held a degree or had completed postgraduate studies and were currently engaged in a further postgraduate study program held the highest level of knowledge.

8.0 SUMMARY.

There was a 35 percent response rate to the survey with a reasonable approximation of respondent characteristics to the NSW Health Department nursing workforce survey for the year. Frequency data relating to sample characteristics and preparation to conduct nursing research were presented. The Likert scale items were examined and as part of the instrument's development, the items relating to nursing attitude underwent factor analysis and reliability assessment. Four factors were identified (knowledge, motivation, support and participation). The items pertaining to self esteem and job satisfaction were examined using factor analysis as separate subscales for the total instrument. Factor analysis explained <45% of the variance. A decision to utilise Rasch measurement analysis was taken to provide further evidence of construct validity and to facilitate the derivation of equal interval level scores for each of the six subscales. The interval level subscale scores were used in multivariate analysis to test the model explaining 'attitude to nursing research'. Multiple regression analysis failed to support the model and multivariate analysis of variance was

conducted to determine if there were any homogenous subgroups within the sample. Significant results were identified for major area of practice, continuing education and highest educational qualifications. Significant interactions were observed between type of training and continuing education also between continuing education and highest educational qualification.

CHAPTER SIX

DISCUSSION AND RECOMMENDATIONS

1. INTRODUCTION

This thesis has been concerned with the attitude of nurses to nursing research. Nursing research can be empowering for nurses, increasing their autonomy and drive for self-determination as a profession and providing a method for the development of evidence-based nursing practice. However, not all nurses have a positive view of nursing research or their capacity to be involved in research as a consumer, collaborator or active participant. Conceptually, an attitude to nursing research was considered to be the composite of several variables that may be modified by other variables unique to the individual nurse. Modifying or influencing variables examined included self-esteem, job satisfaction and specific biographic characteristics of the nurse.

To examine the concept of attitude to nursing research, a scale has been developed, a model tested and differences between groups of nurses identified based on the results of a mail survey. A total of 1,304 (35%) registered nurses in NSW responded. There was good approximation of the sample to the general characteristics of the population based on gender, age and employment position. This discussion will embed the findings in the context of the literature, describe limitations and outline recommendations arising from the study.

2. DEVELOPMENT OF THE SCALE

NURSING ATTITUDE SCALE

The original inventory was based on the author's review of the literature. Six elements or aspects were postulated that might form unique factors contributing to particular types of attitudes to nursing research (see Appendix B and Table 12, p.84 and Table 13 p.85). These elements were: barriers to nursing research, environmental support for nursing research, knowledge of the nursing research process, interest in nursing research, payoffs and benefits from nursing research activities and the utilisation or practice of nursing research. Four factors were identified in the final solution: *knowledge, motivation, support* and *enactment* that form subscales for the construct '*Attitude to Nursing Research*'.

Nine items failed to load leaving a total of 59 items that loaded onto the final solution of four factors. Each of the factors demonstrated more than adequate internal consistency, reliability and homogeneity required for the development of a new scale (De Vaus, 1992; De Vellis, 1991; Knapp & Brown, 1995).

Knowledge (Factor 1)

This factor or subscale consisted of 16 items that were all drawn from the element also previously identified as knowledge of the research process. In terms of research process knowledge, a surprising 45 percent (591/1303) agreed that they had the skills and knowledge to conduct nursing research. When different aspects of the research process were examined there was a varied response. More than

half of the respondents felt they were able to identify research problems relevant to their work (55.7%; 723/1299). Forty-eight percent (633/1297) felt able to conduct a background literature search whereas only 31.5 percent (407/1291) agreed they could conduct a computer literature base search. There was more difficulty in writing research hypotheses by respondents (46.8%; 606/1297) compared with writing research questions (40%; 519/1299). Only 43 percent (563/1297) agreed that they understood the need and implications for different sampling techniques and sizes. Almost half of the respondents indicated a lack of knowledge in relation to research design (49.7%; 646/1301). The response to items pertaining to statistical measurement and analysis was varied. Whilst less than 36 percent (379/1298) expressed familiarity with different measurement scales and statistical analysis techniques (36%; 467/1302) more than 50 percent (664/1299) agreed they were able to interpret research results or experienced no difficulty in understanding the meaning of statistical results (62%; 806/1300). In terms of communicating research results less than 30 percent (407/1291) agreed they possessed good research report writing skills. A similar response was noted in the item that dealt with ability to prepare a conference paper (30.1%; 390/1297). The high proportion of uncertain responses to these last two items dealing with documenting research might suggest that a number of respondents had not attempted these activities and were uncertain of their capacity.

The responses to the *Knowledge* subscale suggest that possession of knowledge and related skills of the research process may be an important aspect of the

development of a particular attitude towards nursing research. The responses indicate that ongoing education in relation to acquisition of nursing research knowledge and skills is important. This is confirmed by the respondents' identification for the need for further courses and their level of agreement with expressed knowledge and skills related to nursing research activities.

As commented upon previously, direct comparison to the literature was difficult because of the instrument differences and the reporting style of the authors. However, there is a consensus in the literature that a lack of knowledge of the research process is generally associated with more negative attitudes and a lack of involvement at any level in nursing research (Boothe, 1981; Bostrom et al., 1989; Bostrom & Suter, 1993; Ehrenfeld & Eckerling, 1991; Fugleberg, 1986; Poster et al., 1992; Rizzuto et al., 1994; Selleck et al., 1996; Wright et al., 1996).

Motivation (Factor 2)

This subscale consisted of 20 items. As suggested previously, all items pertain to issues or situations that could motivate nurses to become active or supportive of nursing research. The presence or absence of these motivational factors may influence the development of a particular attitude to nursing research.

Less than 25 percent (313/1273) of respondents disagreed with the statement that if they had research skills they would become involved in research activities. The large number of uncertain responses to this item (31%) could indicate some

ambivalence regarding opportunity, support or other motivational aspects. In terms of research being a priority issue, 57 percent (734/1302) disagreed with the item that research was a high priority compared to 43 percent (561/1301) who agreed with the item that research was not a priority for them. This could be related to the relatively poor perception of the payoffs for individuals, consumers and the profession, particularly amongst clinicians. Less than 15 percent (184/1278) agreed that they would conduct research to assist in promotion and only 31 percent (396/1296) perceived any benefit from conducting nursing research in relation to a positive performance appraisal. Forty-three percent (550/1288) believed that research was important for patient care while 53 percent (681/1297) agreed that nursing knowledge could only be advanced through research.

Motivation could also be affected by the presence of barriers. These barriers included issues of workload and time relief. Forty-seven percent (601/1267) felt that they would be more involved in research if their patient load was lightened. More than half of the sample agreed that more time needed to be allocated to allow them to engage in research activities (53%, 682/1292; 54%, 697/1300). Other impediments included lack of funds to conduct research (42%, 547/1295). A lesser number (35%, 454/12860) saw access to funding sources as being problematic. Further barriers for some nurses included a lack of skill in proposal preparation (37%, 456/1283) or lack of resources to assist in the analysis of results and findings (35%, 445/1280). More than half (56%, 720/1285) required

assistance from a more informed person to assist them in the conduct of research. Almost half of the sample expressed an interest in conducting research (48%, 612/1299) whilst more than 55 percent (721/1300) agreed they would be interested in conducting research into a patient care problem.

Available literature also supports the existence of similar barriers to nursing research in the international arena, particularly time allocation and a lack of funding (Boothe, 1981; Poster et al., 1992; Rizutto et al., 1994; Selleck et al., 1996).

The *Motivation* subscale therefore suggests that for some nurses there are a series of issues that might affect their motivation to participate in nursing research. These include basic interest in nursing research, proposal preparation and analytic skills, access to funding and heavy workloads with no time relief for research activity. In addition, the benefits of participating in research are not strongly recognised.

Support (Factor 3)

The subscale comprised of 14 items that primarily related to the perception of environmental support and encouragement to conduct or participate in nursing research.

Encouragement appears to be limited with only 25 percent (318/1270) of respondents affirming that they would receive praise from peers and colleagues if they participated in research activities. Similarly, only 21 percent (275/1294) perceived encouragement by other health professionals for research participation by respondents. The receipt of anticipated praise on completion of a research project was more positive (46% agreement, 601/1296).

There was a strong perception of limited employer or work related assistance to engage in nursing research. Less than 13 percent (158/1300) agreed that sufficient time was available to conduct research. A similar number expressed agreement to the allowance by supervisors in daily workload assignment for research activity (12%, 151/1284). The perceived opportunity to conduct research in the workplace was also limited (20.5% agreement, 265/1288). Items dealing with tangible assistance with statistical analysis found less than 20 percent agreement on availability in the workplace (224/1298; 254/1298). Less than 10 percent (123/1301) of respondents acknowledged the availability of secretarial assistance. The availability of a research consultant was only agreed by 25 percent of the respondents (335/1304). The opportunity to upgrade skills and knowledge through employer provision of a continuing education program was perceived to be available by 30 percent of respondents (399/1295).

The response to items within the support subscale suggests that there is a real issue of a perceived lack of environmental support from employers and to a lesser

extent from peers and professional colleagues. This situation is confirmed in the international literature particularly in relation to workplace research support infrastructure (Boothe, 1981; Bostrom et al., 1989; Poster et al., 1992; Rizzuto et al., 1994; Selleck et al., 1996).

Enactment (Factor 4)

Nine items that were drawn from the elements relating to barriers and the practice/utilisation of nursing research comprised this subscale. The majority of the items related to access to participation in nursing research, in that, they were concerned with the perception of who should participate or conduct nursing research. More than half of the respondents agreed that all nurses could engage in nursing research (764/1302). There was a strong disagreement response to the concept that only certain types of nurses should conduct nursing research. The strongest responses related to only other health professionals conducting nursing research (88% disagreement; 1147/1299) and nurses with university degrees (88% disagreement, 1145/1299). The notion that research should only be conducted by nurse academics received an 84 percent disagreement (1192/1303) and a lesser level of disagreement was registered for support of research only being initiated by clinicians (70%, 914/1300).

The other items related to subject participatory aspects and the relative importance of patient care compared to research. More than half of the respondents (58%, 748/1280) agreed that time spent performing patient care was more important than

time spent conducting research. Forty-eight percent of respondents disagreed that patient participation difficulties prevented research activity (618/1286). Less than 5 percent of respondents felt that the informed consent process was a barrier preventing research (60/1273).

Response to the thematically mixed items within the *Enactment* subscale suggests that respondents felt strongly that particular groups of nurses and other health professionals should not be the only persons to conduct nursing research. This sentiment has been echoed in other literature (Boothe, 1981; Bostrom & Suter, 1989). However, responses also indicated that not all nurses could engage in nursing research and that there was still a prevailing view that time spent providing patient care was more important than time on research activities. Recruitment of patients and negotiating informed consent was not perceived to be formidable barriers. Comparison of responses to the last two major themes of the subscale were not able to be discretely located in the international literature.

Attitude to Nursing Research Scale

The four subscales can be used collectively or individually. Collectively they have the capacity to reflect the total attitude of the nurse to nursing research. However, there could be a useful function for their use as individual subscales if particular points of interest are needed. Professional development teams may be more interested in the *Knowledge* subscale to determine confidence with the nursing research process. Nursing administrators may find the *Support* subscale,

Motivation subscale and to a lesser extent, *Enactment* subscales as useful for determining research support infrastructure awareness or deficiencies. The scale as a whole could be useful to professional nurse researchers who are trying to target particular individuals to collaborate or mentor in nursing research endeavours.

MODIFYING INFLUENCES: SELF-ESTEEM AND JOB SATISFACTION

Part of the conceptual model also incorporated the concept that a nurse's attitude could be influenced and perhaps modified by two discrete variables: *self-esteem* and *job satisfaction*. A separate factor analysis was conducted for each of the variables. Both of these analyses revealed that one item for each of the variables was below the previously stated cutoff point of 0.3. These items loaded at greater than 0.2 and evidence was found to support the case for their inclusion because of the large sample size. The previous validation of these items by their respective scale developers and their reliability within the context of this sample also prompted the investigator to retain the two items.

The majority of respondents reported strong feelings of self-esteem. More than 92 percent (1201/1301) felt they had self respect and denied its non-existence (91.6%, 1179/1287). Eighty percent (1047/1299) expressed self-confidence and more than 90 percent (1171/1292) agreed they generally had positive thoughts about themselves. More than 88 percent (1152/1299) felt that they did important things. Finally, 92 percent (1192/1290) felt they were accepting of themselves.

Response to the *job satisfaction* items did not always reflect the same universal positive attitude. On the positive side, more than 90 percent (1177/1298) liked their co-workers. Seventy percent (902/1287) felt that their supervisor was competent and the majority agreed that their supervisors did not act unfairly towards them (84%, 1092/1288). Communications were felt to be good by 52 percent (676/1292) whilst more than 45 percent (589/1300) reported that there was too much fighting and bickering at work. More than half of the respondents (55%, 700/1285) disagreed that the workplace rules and procedures made doing their job more difficult and only 27 percent (355/1297) felt that they had to work harder than they needed to because of the incompetence of the people they worked with. Only 27 percent (356/1295) felt that the work they did in their job was unappreciated. A smaller proportion (18%, 236/1302) felt that their job was meaningless and more than 50 percent (717/1298) disagreed that they felt unappreciated by their employer. A similar response in terms of agreement (42%, 542/1299) and disagreement (42%, 548/1299) was noted in relation to whether recognition at the respondent's expected level was provided. This situation agreement (39%, 513/1299) and disagreement (512/1299) was repeated in relationship to perceived lack of reward for job effort. A further 33 percent (435/1299) agreed that they were not satisfied with benefits or rewards (47%, 604/1299) arising from their job. More than 70 percent (920/1299) felt that they had too much to do at the workplace. A large majority of nurses agreed that they liked their work activities (91%, 1170/1292) and found the job enjoyable (86%,

1115/1301). Almost 95 percent (1233/1301) of respondents expressed pride in their job.

Univariate analysis of self esteem and job satisfaction revealed some interesting findings however, their impact on the nursing attitude scale was unknown and a mechanism was needed to build these two further subscales into the model.

PROGRESSION TO RASCH ANALYSIS

Whilst the factor analytic study provided an interpretable solution and four distinct factors were identified for attitudes to nursing research, a problem remained with its potential as a new scale. As explained previously, the reduction to four factors only explained 43 percent of the variance and this had real implications for the calculation of factor scores. Hair et al. (1995) and De Vaus (1992) suggest that the minimum percentage of variance for a solution is 60 percent in social science research. This suggests that the calculation of factor scores based on the current results maybe inappropriate and that another analytic technique maybe needed to assist in the calculation of scale scores for subsequent analysis. To avoid this criticism of the proposed scale, an alternate method for verifying the construct validity of the scale items and the subsequent derivation of equal interval scores invited the use of Rasch measurement analysis. Rasch analysis considered the same data but from a different perspective and framework in that it is concerned with probability and fit. In addition, Rasch analysis examines not just each item and ranks the items in terms of difficulty, but it also

assesses each respondent and ranks the respondents. Items or respondents that do not fit within the acceptance ranges can then be readily identified (and deleted if warranted) if the derived equal interval scores are used for further multivariate analysis. A further advantage of the Rasch analysis was the capacity to build into the model the two potential modifying variables: self esteem and job satisfaction.

RASCH ANALYSIS FINDINGS

The six subscales (*knowledge, motivation, support, enactment, self-esteem and job satisfaction*) were submitted to Rasch measurement analysis. In general, reliability estimates, infit mean squares and the internal consistency index for all scales were within the prescribed limits demonstrating good fit of the data to the model. There was one exception and that was the item reliability estimate result for the self-esteem subscale. Examination of each of the subscales individually allowed for the identification of items outside the acceptance ranges and the difficulty level of individual items within the subscale. A decision was taken to conduct multivariate analysis on the present findings but to later examine each of the subscales for possible deletion of items (and subscales) in any future applications.

Knowledge subscale:

For future applications of the knowledge subscale it is recommended that the item which dealt with understanding the difference between independent and dependent variables be deleted. This item exceeded the maximum acceptance range. The item would require rephrasing of the question to provide a better

definition of the concept being explored. Two items were found to be bordering on the minimum acceptance range. This suggests that there could be problems with the ability of these questions to discriminate between individuals with varied levels of knowledge. As the items dealt with important concepts relating to knowledge of the nursing research process (proposal preparation skills and sampling knowledge) their retention is warranted but their performance in future applications should be monitored. The ranking in order of overall difficulty for the items in the knowledge scale allowed for the identification of items that could be used as discriminators for individuals with high levels of knowledge. Nurses who agreed that they were familiar with different scales of measurement, understand how to conduct computer literature searches and don't experience difficulty in writing hypotheses would most likely respond in a pattern that gave them a high overall knowledge score. Conversely, all nurses regardless of final knowledge level should be able to agree that they have no difficulty identifying research problems in their area, experience no difficulty understanding research results and would not find a problem locating background literature for a research study. Strong agreement, as opposed to simple agreement to these items would not serve as an adequate discriminator for identifying individuals with high levels of knowledge. Thurstonian scales for the knowledge subscale suggest that strong agreement to being able to interpret research report results and findings and being able to write research questions may also form a discriminatory function for identifying high knowledge achievers. What this suggests is that those respondents with less knowledge would be able to agree with the item statement,

but only those with higher levels of knowledge would be able to move from agree to the definitive strongly agree. In conclusion, the *knowledge* subscale demonstrated good fit for purpose in the discrimination of various knowledge/skill levels of nursing research among the respondents. However, the subscale could be strengthened if the recommended items are deleted or closely monitored in future applications.

Motivation subscale:

In the *motivation* subscale good fit of the data to the model was also demonstrated. No items were located outside the maximum acceptance range excepting one item that was on the border. In future applications, the item that dealt with advancement of nursing knowledge only through research, should be monitored and if it has moved outside the maximum acceptance range deleted from the scale. An item that fell below the minimum acceptance range related to interest in conducting research. This item proved to be a poor discriminator between individuals with high motivation and those with other levels of motivation. Whilst the item may have interest, it may not have a useful purpose within the subscale in terms of discrimination. Individuals who had high levels of motivation would agree with statements that related to the link between research and promotion and indicated that research for them was a priority activity. Individuals with low levels of motivation would be more likely to disagree with those statements. However, they would agree with items which had the least overall difficulty such as conducting research if they had time or someone

knowledgable to assist them. Further discrimination points for individuals with high levels of motivation would be their tendency to strongly agree (rather than agree) with items that research was linked to promotion, involvement in research would occur if they had access to funding and that they knew how to analyse results. In summary, the *motivation* subscale could provide a useful mechanism for identification of areas that nurses felt strongly encouraged them to participate in nursing research activities. Conversely, areas where motivational links were not apparent could also be identified.

Support subscale:

Good fit of the data to the *Support* subscale was demonstrated. There were no items that exceeded the acceptance range suggesting excellent construct validity for the subscale. All items could also serve as reasonable discriminators between respondents with high and low levels of perceived support for nursing research as no item fell below the minimum acceptance range. Items that were identified with a higher score for level of support were those items that related to the provision of secretarial assistance and time to conduct nursing research. Most respondents regardless of overall support perception could agree with the fact they would receive praise if they completed a research project and that their employing organisation held ongoing education to assist them in the conduct of nursing research. Nurses who perceived lower levels of support would be unlikely to strongly agree (rather than agree) that peers encouraged or assisted them to conduct nursing research. The *support* subscale provides a useful measure and

indicators of the type of support that is available in the nursing community for involvement in nursing research. This subscale requires no modification for future applications.

Enactment subscale:

The *enactment* subscale demonstrated good fit of the data to the model and requires deletion of only one item. This item was identified as falling below the minimum acceptance range and related to only professional nurse researchers being able to participate in nursing research activities. The aforementioned item demonstrated a reduced ability to discriminate between high and low scorers in the subscale. The most difficult questions overall in their capacity to attract extreme responses from respondents related to deciding if time spent providing patient care was more important than research and that patient participation in nursing research was difficult to obtain. Individuals who scored highly on this subscale would be more likely to believe that time spent on research was as important as time providing patient care and that they did not experience any difficulty recruiting patients into nursing research projects. The easiest items for all respondents to agree with were those relating to certain types of nurses or non-nurses being able to participate in nursing research. All respondents regardless of final score would be likely to support the idea that a wide variety of nurses should be involved in nursing research activities. The *enactment* subscale provides a useful barometer of individual perceptions and beliefs about who should be involved in nursing research and difficulties with access to subjects.

Future applications should be conducted with the omission of the aforementioned item relating to research only by professional nurse researchers.

Self-esteem subscale:

The *self-esteem* subscale whilst displaying good fit of the data for case reliability, infit mean square and internal consistency was seriously below the minimum standard for item reliability. This could be related to the original target audience of adolescents for these items. Perhaps for adults these item statements are too easy to strongly agree or strongly disagree with and the issue of self-esteem is not as problematic as it is for the adolescent population. The selection of this scale was based on availability and its validation within a late adolescent population. The investigator at the time of selection did not conceive there would be any problems in its transference to an adult population. In addition, self-esteem was not considered to be a direct part of the concept of attitude to nursing research merely a variable that could influence final attitudes. There were two particular items that Rasch analysis identified as being problematic. Both of these items related to the sense of importance that the person ascribed to themselves or their activities. In the context of this study respondents indicate that construct validity for these items is not clear cut and that further explanation or contextualisation is needed. Two items that demonstrated poor discrimination between respondents with different levels of self-esteem were those relating to self-acceptance and having positive thoughts about themselves. Rasch analysis would suggest that these two items should be deleted in future applications of the subscale. The items

that presented the most overall difficulty for respondents to answer related to self-confidence. Respondents with high levels of self-esteem would be more likely to select strongly agree to the statement relating to having a lot of self-confidence and to strongly disagree that they lacked self-confidence. In conclusion, if this subscale was to be used in future investigations of the same context, then it would be recommended that either modifications in line with earlier discussion be enacted. It would be preferable to use a measure of self esteem more generalizable to an adult population, for example the Barksdale Self-esteem Index (Barksdale, 1972; Dagenais, 1981) or the Rosenberg Self-esteem Scale (Rentsch & Heffner, 1992; Rosenberg, 1979).

Job satisfaction subscale:

The final subscale submitted for Rasch analysis related to job satisfaction. The subscale met all the requirements for demonstrating good fit of the data to the model. One item, dealing with the concept of having too much to do at work, was identified as exceeding the maximum acceptance range. This item failed to demonstrate adequate construct validity and would require deletion or modification. In addition, the item presented as the most difficult for respondents to answer suggesting that those in extreme disagreement tended to be those respondents with higher levels of job satisfaction. A further item was identified as having poor discrimination ability between those respondents with varied levels of job satisfaction. This item was concerned with the amount of appreciation the respondents felt they received. A sense of being appreciated or not appreciated

does not appear to be discriminatory in the scheme of overall job satisfaction and this item should probably be deleted. Nurses with high levels of job satisfaction were able to agree strongly that they received the recognition they should or that they did not have too much to do at work. In summary, the *job satisfaction* subscale (like *self-esteem*) was considered a modifying variable and with the recommended modifications the results indicate this subscale could be confidently used again in a similar study.

In conclusion, Rasch measurement analysis provided an opportunity to scrutinise each of the subscales for fit of data to the model and to establish individual subscale scores that could be confidently used in the subsequent multivariate analyses. The detailed analysis of each subscale facilitated the identification of areas where the scales should be modified for future applications. The final inventory for the assessment of *attitude to nursing research* is located in Appendix H). Recommendations for a final scale for the *self esteem* and *job satisfaction* variables are located in Appendix I. The next step involved testing the model to consider the nature of dependence and independence within the variables and to examine if any of the hypotheses had been upheld.

3.0 TESTING THE MODEL

A number of alternate hypotheses was generated to test the model and their outcomes were examined using multiple regression analysis and Manova.

H¹. Higher motivation subscale scores will be associated with higher scores in the knowledge, support, enactment, self-esteem and job satisfaction subscales in NSW nurses.

Multiple regression failed to support any significant association by the subscale motivation with all of the dependent variables. Only one variable was significantly associated and that was the knowledge subscale ($p=0.004$). Therefore the hypothesis is not supported.

Further multiple regression analyses were attempted to discover if there was another true dependent variable. Results indicate that the best solution was achieved with the self-esteem variable acting as the dependent variable and the subscales of knowledge, motivation, support, enactment and job satisfaction as the independent variables. Significant associations were established for the subscales knowledge, support and job satisfaction ($p<0.001$). However, the model failed from two perspectives. First, it failed to account for all the independent variables and particularly those directly related to the nursing attitude subscales. Second, conceptually it was not meaningful. Self-esteem had been introduced as a possible influence on nursing attitude to research, not a principal factor.

The overall heterogeneity and subsequent failure of the model led to the exploration of the data by Manova to establish if there were any particular differences between groups within the sample. The biographic characteristics of

age, major area of practice, years of professional nursing experience, basic nurse training origin, highest educational qualifications and continuing education were investigated to determine any differences with the aforementioned subscales.

Multivariate analyses revealed that a number of hypotheses generated (pp.73-75) were not supported. No relationships were found to exist at the $p < 0.05$ level for *age* (H^2), *years of professional nursing experience* (H^3), *basic training type origin* (H^5) and the six subscales at the multivariate level. Nor were any significant interactive relationship differences formed between *age, years of experience* and *years of professional nursing experience* and the subscales (H^{8-10} and H^{14}). In addition, no significant interactive differences were formed on the basis of *type of training* and *highest educational qualification* (H^{12}) or *type of training, continuing education* and *highest educational qualification* (H^{15}) with the six subscales. However, several hypotheses previously generated could be accepted in part or whole and it is proposed to discuss these results individually.

H^4 . *There will be increased motivation, knowledge, support, enactment, self-esteem and job satisfaction subscale scores in NSW nurses for those nurses working primarily in education, research or administration (non-clinicians) compared to nurses working primarily in the clinical area (clinicians).*

The results demonstrated a significant difference at the multivariate level ($p=0.008$). Subsequent univariate analysis revealed that the significant difference between the two major practice areas existed for the knowledge ($p=0.05$) and the enactment ($p=0.001$) subscales. Nurses' belonging to the non-clinician group that was comprised of nursing administrators nurse educators/academics or nurse researchers had a greater level of research process knowledge and skill than their clinical colleagues did. An explanation for this would include that the non-clinician group generally would probably have been exposed to higher education to acquire and maintain their positions. It could be suggested that they would have had a greater opportunity to acquire increased research process knowledge and skill as part of that educational process. Other investigators have reported similar findings whereby clinicians view themselves as lacking the necessary skills and knowledge to appreciate research or be involved in the conduct of research relative to other nurses (Fugleberg, 1986; Eckerling et al., 1988; Perez-Woods and Tse, 1990; Selleck et al., 1996).

The reaction to the enactment subscale suggests clinicians were less inclined to believe in the possibility of access to involvement in nursing research than non-clinicians. Clinicians perceive more strongly that only certain types of nurses should be involved in nursing research and that there are more barriers in recruitment of subjects. Furthermore, they are not as convinced that time spent on research activities is as advantageous as time spent providing patient care. There

was no direct evidence relating major area of practice to enactment type items reported in the international literature.

H⁶. There will be increased motivation, knowledge, support, enactment, self-esteem and job satisfaction subscale score in NSW nurses for nurses who are currently studying honours or postgraduate level studies compared to nurses who are not currently studying or attempting postbasic certificate or degree/diploma conversion studies.

Multivariate analysis was significant for differences in continuing education at the $p < 0.001$ level. Significant univariate results were achieved for the knowledge ($p < 0.001$), motivation ($p < 0.05$) and enactment ($p < 0.001$) subscale scores in relation to continuing education.

Nurses not currently engaged in further education studies demonstrated less knowledge, motivation, and perceived that there were more limitations in terms of access to participation in nursing research than the other two groups. Nurses engaged in honours or postgraduate programs (master's level or doctorates) had the highest level of knowledge, were more motivated to engage in research and perceived less barriers to involvement in research for all nurses than other nurses. This would seem reasonable as nurses undertaking postgraduate studies would be exposed to research coursework and may also have to complete a research project

as part of their course of study. Thus, a heightened sense of enthusiasm, and a demonstration of more competence in research skills and knowledge would not be unexpected. Nurses not currently studying or undertaking lower level types of courses would not have the same exposure to research content. In addition, the completion of a research project may not be a course requirement or condition for continuing employment. The lower levels of knowledge may then promote the notion that research is or should be limited to those who can participate and not necessarily the province for all nurses.

There was no discussion in the international literature relating to education qualifications in progress (continuing education).

H⁷. There will be increased motivation, knowledge, support, enactment, self-esteem and job satisfaction subscale score in NSW nurses for nurses holding a degree, honours or postgraduate level qualification compared to those nurses who only hold a basic certificate, associate diploma or postbasic certificate as their highest level of educational qualification.

A significant difference for level of highest educational qualification was identified at the $p < 0.001$ level. Univariate analysis revealed that highest educational qualifications significantly affected all four of the nursing attitude

as part of their course of study. Thus, a heightened sense of enthusiasm, and a demonstration of more competence in research skills and knowledge would not be unexpected. Nurses not currently studying or undertaking lower level types of courses would not have the same exposure to research content. In addition, the completion of a research project may not be a course requirement or condition for continuing employment. The lower levels of knowledge may then promote the notion that research is or should be limited to those who can participate and not necessarily the province for all nurses.

There was no discussion in the international literature relating to education qualifications in progress (continuing education).

H⁷. There will be increased motivation, knowledge, support, enactment, self-esteem and job satisfaction subscale score in NSW nurses for nurses holding a degree, honours or postgraduate level qualification compared to those Nurse's who only hold a basic certificate, associate diploma or postbasic certificate as their highest level of educational qualification.

A significant difference for level of highest educational qualification was identified at the $p < 0.001$ level. Univariate analysis revealed that highest educational qualifications significantly effected all four of the nursing attitude

subscales. No significant difference was found with self esteem or job satisfaction. Knowledge and motivation were found to be significant at the $p < 0.001$ level, whilst support and enactment were significant at the < 0.05 level.

Nurses who had the lowest form of qualification (the basic nursing certificate) generally had the least knowledge, were less motivated, perceived less environmental support availability and saw less opportunity for all nurses to be involved in nursing research. Nurses with post basic certificates or associate diploma level qualifications demonstrated a greater knowledge, were more motivated, enjoyed more environmental support and perceived more opportunities for nurses to be involved relative to those nurses who held only a basic certificate. The group that had the highest scores for all subscales were those who held a degree or higher education postgraduate studies qualification.

Similar to continuing education, it could be expected that nurses who had been exposed to more complex studies that would have included at least some research content, would demonstrate greater interest; skills and knowledge; awareness of support availability; and that potential barriers to involvement in research were not as non-negotiable as those nurses not exposed to higher level education.

The international literature supports these findings. Bostrom et al. (1989), Eckerling, Bergman & Bar-Tal (1988), Ehrenfeld & Eckerling (1991), Fugleberg (1986), O'Brien & Heyman (1989), Poster et al., (1992), Perez-Woods & Tse

(1990), Rizzuto et al., (1994) and Selleck et al., (1996) found that increased level of educational qualifications was associated with a more positive attitude to nursing research. Furthermore, Bostrom et al. (1989) identified non-baccalaureate graduates as having less confidence in their research process knowledge and skills and perceiving less environmental support for nursing research relative to respondents with a baccalaureate or higher qualification. Selleck et al. (1996) report in their Victorian study that degree and postgraduate qualified nurses are more likely to be involved in research, confident in their ability to conduct research, demonstrate positive attitudes about the importance of nursing research to clinical practice and professional recognition.

H¹¹. There will be increased motivation, knowledge, support, enactment, self-esteem and job satisfaction subscale scores in NSW nurses for university or college of advanced education trained nurses who are currently studying an honours or postgraduate course compared to nurses that trained in a hospital who are either not studying or are attempting postbasic certificate or diploma/degree conversion studies.

Differences for type of training and continuing education interaction were found to be significant at the $p < 0.05$ level.

Univariate analysis revealed that the only variable for which there was a significant interaction occurrence with different training type and continuing education was job satisfaction ($p=0.025$). Hospital trained nurses' generally experienced marginally higher levels of job satisfaction than their university trained colleagues. The most marked difference in mean scores occurs between the two training groups attempting postgraduate educational studies. A possible explanation for this situation, may include the fact, that hospital trained nurses were prepared in an apprenticeship style for future practice. They combined work and studies from the outset of their nursing experiences. University trained nurses have generally enjoyed the status of full-time students. The effect of now having to work and also combine studies may be a factor in reducing their perception of job satisfaction relative to the hospital trained nurses. There were no comparable findings located in the literature and this present finding may be unique within the context of this study.

H¹³: There will be increased motivation, knowledge, support, enactment, self-esteem and job satisfaction subscale scores in NSW nurses for nurses currently undertaking honours or postgraduate studies with a highest level of qualification at degree, honours, or postgraduate level compared to nurses currently not studying or attempting postbasic certificate or diploma/degree conversion programs and holding only a

basic certificate or associate diploma as their highest qualification.

Significant differences were identified at the multivariate level for the interaction between continuing education and highest educational qualification ($p < 0.003$). Univariate analysis demonstrated that the significant interaction was only observed in the Knowledge subscale ($p = 0.035$). It could be expected that nurses with only basic certificate preparation and who were not involved in further studies might have the least knowledge or skills of the research process. These nurses would have experienced minimal formal content to prepare them for an active role in nursing research. Conversely, nurses with degree or postgraduate studies qualifications and who were currently engaged in further postgraduate studies, demonstrated their probable more formal exposure to research content and skills by achieving higher knowledge scores. This currency of knowledge, coupled with the usual requirements of postgraduate studies to complete a formal assessment task related to research methods and applications provides an explanation for the difference in the scoring patterns. The achievement of middle range scores for knowledge by those groups who were either post basic certificate qualified or undertaking this level of education is not unexpected. These types of courses are generally more applied and some level of research processing is required in the form of literature review and critique. However, it is unusual for students in these programs to undertake a formal research task. No comparable findings were available in the literature surveyed.

In summary, the application of multivariate analysis of variance has identified several homogenous subgroupings within the sample. Evidence for significant differences between the variables has been discussed and related where possible to international findings.

4. PREPARATION FOR EVIDENCE-BASED NURSING PRACTICE.

More than 50 percent of the respondents reported a lack of preparedness to conduct nursing research. This finding is similar to that of Wright et al. (1996) where 50 percent of their hospital trained respondents indicated that they had received no research preparation in their undergraduate program. Furthermore, Wright et al. (1996) reported that only 16 percent of the sample of hospital trained nurses, compared to 56 percent of university trained graduates felt that their research preparation was well covered. What is evident, is that there is a diversity of skill level and knowledge in relation to preparedness to be involved in nursing research at the consumer, collaborator or participant levels.

As reported earlier, 45 percent of respondents felt they had the knowledge and skills, but the indication by 94 percent for the need for additional research process knowledge and skill education suggests a considerable number of nurses feel the need to extend their knowledge and skill base. Selleck et al. (1996) found that 42 percent and 46 percent of their respondents would be interested in upgrading their knowledge and skills. In the current study, a preference for refresher courses rather than a major course of study was also indicated and the limited response for

any one content area (<30% for specific topics) suggest that an alternative to the traditional approach could be considered. Perez-Woods and Tse (1990) suggest that traditional research education courses often have a tendency to overwhelm nurses rather than empower them. This may be due to the emphasis on the nurse researcher rather than the nurse as a consumer or as a utiliser of valid research findings (Harrison et al. 1991). Bostrom and Suter (1993) argue that research utilisation is part of professional development and that this process starts with research curiosity, research skill building and progresses to research participation and finally utilisation. They suggest that continuing education relating to nursing research could also be developed in the same way. Target groups based on education level and research knowledge experience may be a useful starting point. Poster et al. (1992) recommends that a research skill, knowledge and attitude profile could be gathered for each new employee (and retrospectively for longer-term employees) and this information used as a basis for structuring and developing continuing education. The Royal College of Nursing, Australia in their draft position paper 'Research in Nursing Practice' identifies the importance of universities in preparing nurses to understand, appreciate and conduct research (McMurray, Hamilton, Pearson & Clare, 1997). However, they do not address the issue of the importance of inservice type education for the large number of nurses who will not be able, nor desire to, participate in a major university-based course of study relating to nursing research. To change attitudes and develop skills in these nurses, accessible continuing nursing research education is necessary and

could be offered as a university education outreach program and/or in collaboration with Area Health Service professional staff development units.

In summary, if evidence-based nursing practice is to become a reality and a 'way of life' for Australian nurses then the enduring tradition of reliance on anecdotal evidence or personal opinion must be eliminated. One way that this can be encouraged is to provide nurses with the skills and knowledge to make informed decisions. To prepare nurses at the undergraduate level for an active role in research as a consumer, collaborator and participant is not enough. A substantial number of nursing practitioners in the workforce need assistance and new creative methods of encouraging positive attitudes, providing an informed knowledge base and the prerequisite skills if evidenced-based practice is to be inculcated into the discipline.

5. LIMITATIONS OF THE STUDY.

All research designs pose some form of limitation for investigators. Survey research is no exception. This form of research that relies on self-report is vulnerable to misuse by respondents (Polit & Hungler, 1995). Despite assurances of anonymity, respondents may still respond in a manner they believe that the investigator wants them to. This raises the question of how valid and accurate are self-report responses? Whilst this situation is more frequently encountered in surveys where society may judge a particular respondent's answers as wrong or unusual, the same could hold true for some respondents to this survey

(Nieswiadomy, 1993). Response bias could be an issue if respondents felt that they had to take a particular stand on certain issues relating to nursing research that those individuals believed would be considered more appropriate or valued by the investigator. In addition, they may claim that they possess certain knowledge or have experienced certain situations that in reality they have not. Furthermore, questionnaires often attract responses from individuals who have relatively strong feelings about the issue being explored and the group of respondents often missed in mail surveys are those who are ambivalent (De Vaus, 1991; Polit & Hungler, 1995; Seaman, 1987).

As a mail survey, the investigator loses control over who actually responds and in what circumstances. It may happen that someone completely unintended has responded to the questionnaire or that the questionnaire was completed in an environment that was not conducive to an honest self-report (De Vaus, 1991; Talbot, 1995).

Another form of response bias that may affect the findings is response set bias (Polit & Hungler, 1995). One of the problems with Likert scales is that it can attract particular response patterns. Some respondents may demonstrate extremeness in opinions by always selecting the most extreme alternative. Other respondents may acquiesce and agree (or alternatively disagree) with all statements. To avoid this type of response pattern the investigator did provide for the inclusion of positive and negative items to counterbalance this affect. Another

response pattern related to Likert scales is the respondents who avoid extremeness of opinion by always selecting middle-range alternatives (De Vaus, 1991; Polit & Hungler, 1995).

Mail surveys traditionally have considerable variations in response rates. The 35 percent response rate may lead reviewers to consider that the sample was not representative of the population. Attempts have been made to address this situation by comparing the sample characteristics with those of the NSW Nursing Workforce database. A reasonable approximation was found to exist. The response rate could have been expanded if a follow-up letter or distribution of the questionnaire had been conducted (De Vaus, 1991; Talbot, 1995). However, as explained previously, for financial reasons this was not possible and the issue of increased response rate may always be an area of limitation for this investigation. Another limitation for this study may be the development of the attitude to nursing research subscales based on a factor analysis that only explained less than 45 percent of the variance. The accepted standard for social science research is closer to 60 percent (Hair et al., 1995; Tabachnick & Fidell, 1996). This was one of the reasons underlying the investigator's selection of Rasch measurement analysis to explore the subscales and determine their goodness of fit from a different perspective afforded them by only using factor analysis.

The failure to substantiate the model using multiple regression analysis and the aberrant finding of the self-esteem variable as the strongest candidate for the dependent variable within the model could also be considered a limitation. The model may have been supported if the sample was not as heterogenous. Alternatively, the model could have been conceptualised differently and explained in terms of subgroups or typologies.

In hindsight, the selection of the self-esteem inventory may have been inappropriate, as it had only been validated with late adolescents. The use of a validated adult scale may have yielded different results.

Survey research essentially captures a picture of the situation or attitude at a given point in time. The investigator was conscious of her employment brief to increase the profile of nursing research within the clinical arena and was concerned about the impact of such activities on the type of responses as that profile increased. Consequently, the questionnaire construction and distribution was conducted within a relatively short time span, particularly in relation to the first sample. Despite pilot testing to reduce ambiguities, there were questions that in hindsight could have been included to provide additional variables for multivariate testing. In particular, questions that discretely asked about the respondent's past, present and future activities within nursing research may have been valuable.

In summary, the major limitations for this investigation included: the reduced response rate; nursing research attitude subscale development based on a less than desirable account of variance explained; the use of a self-esteem scale not validated in adult populations; and the normal problems associated with the use of mail survey questionnaires using Likert scale responses.

6. CONCLUSIONS AND RECOMMENDATIONS

Although a substantial survey has been conducted amongst registered nurses in NSW in relation to their attitudes to nursing research any findings must be treated with some degree of caution as discussed in the limitations. Nevertheless, interesting information has become available from respondents in relation to potential latent variables that may contribute to a particular attitude to nursing research.

Emerging from the data was information that suggests that a substantial number of nurses could be ill prepared to participate in nursing research activities. This is affirmed by the recognition of the need for further courses in research skill and knowledge by the majority of respondents. A presumption could be made that a lack of skill or knowledge may diminish interest, recognition of opportunities to participate in nursing research and form a substantial barrier in the conduct of nursing research.

The respondents feel strongly that research activity should not be limited and encouraged in elite sub-groups such as nurse academics or professional nurse researchers. Nor should it be the exclusive province of clinicians that may be recognition of a wider base for nursing research other than the clinical arena.

What is disappointing is the limited perception of employer or work related support for the involvement of nurses in research. It appears that nurses do not have access to resources that researchers in other professions take for granted such as secretarial support or assistance with analysis of results and findings. Nor are they supported in terms of encouragement or by the provision of time release to conduct research. It also appears that there is only a limited perception of the benefits that could be derived from research in terms of client outcomes or promotional claims. These results are similar to international findings (Boothe, 1981; Bostrom et al, 1989; Bostrom & Suter, 1993; Rizutto et al, 1994).

The survey responses did reveal the existence of four latent variables that may contribute to the development of a particular type attitude – Knowledge, Motivation, Support and Enactment. As these factors only accounted for less than 45 percent of the variance, alternative methods of constructing individual scores amenable to further multivariate analysis needed to be considered. Rasch measurement analysis was used to validate the scales by examining goodness of fit and interval level scores for respondents in each of the subscales. Together with self-esteem and job satisfaction, the model was tested and found to fail in its conceptual explanatory power. It was suspected that part of the reason for that

failure could have been related to the heterogeneity of the group. Subsequent multiple analysis of variance revealed the existence of significant groups who responded to the subscales in a particular manner.

The leading national professional body for nurses (the Royal College of Nursing, Australia) has recently released a draft position statement relating to nursing research (McMurray et al., 1997). This statement calls for “*the nursing profession to strengthen its research culture and support evidenced based nursing practice to make visible the contribution of nursing practice to the health and wellbeing of people*” (McMurray et al., 1997). This investigation provides valuable evidence of the components that contribute towards attitudes to nursing research. For nursing research to flourish and grow in the meaningful and rigorous manner suggested by the Royal College of Nursing, promotion of positive attitudes needs to be encouraged at all levels of nursing. Nurses need to acquire the *Knowledge* and skills of research processing to enable them to be informed consumers and active partners in the research process. *Motivation* to be a part of the growth of nursing research in Australia needs to be encouraged by the reduction of barriers and the offering of more tangible rewards for advancing the profession through research endeavours. *Support* by all levels of nurses for research needs to be encouraged and infrastructure developed to ensure quality research is able to be initiated, completed, disseminated and incorporated into nursing practice where appropriate. Opportunities for the *Enactment* into nursing research are critical. Access to participation and the promotion of the belief that all nurses have some

role to play within the sphere of nursing research either as a consumer, collaborator or major researcher is essential if the nursing profession is to grow and be valued for its unique contribution to health care.

However, this investigation was premised on the assumption that all nurses could engage in nursing research. Experience and this investigation reveals that this may be a false assumption. It would seem that without the knowledge, (acquired through higher learning), the motivation, (recognition of intrinsic and extrinsic benefits of research), the environmental support, (tangible support and infrastructure to initiate, conduct and utilise research findings), and potential for participation, (enactment) that nursing research may *not be* the province of all nurses at this time. Nor possibly should it be. To engage in meaningful and rigorous research requires not just enthusiasm, support and access to the research arena but also knowledge. Knowledge of the correct decisions to make throughout the research process. To hope that all nurses achieve this level may be unrealistic in the short term, but to hope that all nurses can recognise and benefit from relevant and thorough research endeavours remains important.

This investigation suggests that there are certain types of nurses who are 'ready' to engage in research as they have some or all of the prerequisites. Energies may be better expended in addressing their specific deficits eg. Opportunity, resources, even knowledge to continue their active involvement in nursing research and potential to increase nursing's scientific knowledge base. Other types of nurses

could benefit more from information that helps them to appreciate what are useful and applicable research findings and what is suspect.

This investigation was commenced when the researcher was seeking to develop a strategic plan and infrastructure to support nursing research as a collaborative venture between health services and higher education. Although no longer in this employment position, the researcher has considered the findings in the light of this role and the formulation of strategic objectives together with the methodological issues arising from the investigation. As a consequence, the major recommendations arising from this study are:

1. Identification and support of those nurses who are able to and desire to be active in the nursing research process; achieved by pre-employment (or post-employment) assessment, advertising of research opportunities and the establishment of research sharing forums within the workplace.
2. Implementation of continuing education courses within the workplace or in higher education institutions to assist nurses to acquire research skills and knowledge of the research process. Different tiers of programs could be developed to provide information initially for nurses as consumers of research, and other programs at a more complex content level with an emphasis on the nurse as an active participant in nursing research.

3. The development of a more supportive infrastructure to assist nurses in the initiation, conduct and dissemination of nursing research findings. Critical infrastructure issues identified in this investigation include: time release for nursing research, research consultancy and mentorship availability, secretarial support for preparation of proposals and report writing, assistance in the analysis of results and findings.
4. Providing a greater awareness and access to research funding through dissemination of available funding opportunities and providing assistance in the preparation of research funding proposals. Lobbying for increased access to research funds and positions on research funding authorities that have traditionally been denied or restricted to nurses.
5. Emphasising the importance of research involvement particularly in higher level clinicians (nurse specialist or consultant) by ensuring that research activity is part of their performance objectives, and that promotion and maintenance of a higher level position is contingent on an active research role and contribution to the growth of nursing knowledge.
6. Development of affirmative action plans by senior nurses with strategic goals for increased consumerism of research findings and positive sanctions for those nurses who are willing or already active participants in nursing research. This would include fostering a culture that supports and

recognises the value of nursing research and the acceptance of only those policies and procedures in the workplace that are definitively evidence-based.

7. Further studies to determine the subsequent validity of the subscales (following recommended modifications) for the assessment of attitudes to nursing research.
8. Further exploration of a model based on the four subscales of attitude to nursing research using other multivariate techniques such as cluster analysis or structural equation modelling to examine the potential for the identification of typologies of nursing research attitude and involvement.

In conclusion, evidence-based nursing practice requires nurses to be prepared and committed to the initiation, conduct and dissemination of nursing research. To accomplish this end, nurses need support by employers and colleagues and recognisable rewards to acquire and maintain the skills and knowledge related to the research process. Ultimately, all nurses could be involved in nursing research be it as a consumer, collaborator or active participant in the initiation, conduct and utilisation of nursing research. However, it may be more strategic in the short term to identify and support nurses who are capable of participating in the research process. At the same time, providing nurses with knowledge and skills to be part of the research process through introduction of continuing education

opportunities and tangible rewards could enhance the longer-term objective of decreasing the research-practice gap. Initially, this would be directed at encouraging nurses to be informed consumers and then ultimately as collaborators or initiators of nursing research thus fostering evidence-based nursing practice.