

**Work motivations as predictors of academic and clinical performance
and satisfaction with career choice in medical students**

Submitted By

Marilyn Frances Powell, Dip. Tching, RN, BN, MNs

Thesis submitted for the degree of Doctor of Philosophy

University of Newcastle, Australia

March 2009

- Declaration -

I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a higher degree to any other University or Institution.

- Acknowledgements –

I would like to express my heartfelt appreciation to Professor David Powis (Principal Supervisor, Professor. School of Psychology, Newcastle) for inviting me to take up the challenge of this research, for generous and prolonged support and for continually encouraging me to push my intellectual and personal boundaries. I would also like to thank Dr Miles Bore (Co-Supervisor, Lecturer, School of Psychology, Newcastle) for his warm hearted support and many creative insights over the past 4 years.

My thanks also to Kim Colyvas (Statistics support, Newcastle), for transforming the challenge of statistics to a pleasant learning experience, Patrick Merlevede for the generous provision of the iWAM instrument for this research and Abigail Powis for her skilled administrative support.

Very special thanks to my husband, Iain Melville, and my parents, who have supported this prolonged endeavour with practical help, love and understanding.

Lastly, my warm thanks to my friends, Dr Carl Harshman, Anna Watters, Kirrilee Hughes and Marita Ryan for your encouragement and support over a sustained period

- Dedication -

To Iain Melville

for encouraging me to continually develop and follow my dreams

and

my three mentors,

David Powis, Miles Bore and Kim Colyvas

- Table of Contents -

Contents

Abstract

Chapter One- Work motivations and medical student selection

Current issues associated with the medical selection debate

Current research and commentary on the `good doctor`

Current selection processes

The predictive ability of academic criteria in medical selection procedures

The predictive validity of University Admission and Aptitude testing

Personal attributes that may further explain medical student clinician performance

A review of motivation in the medical literature

What is Work motivation

Contributors to Work Motivation

Motivation theories

Work Motivations and critical work outcomes

Applications of work motivations: person- job fit and selection

Current assessment of motivation in medical selection

Specific work motivations and medical student outcomes

Researching work motivations in medical students

Contents

Chapter Two - Measuring Work Motivation

Work Attitude and Motivational Profile (iWAM)

Background to the iWAM instrument

The basis of the iWAM motivation patterns

Background to metaprograms

Metaprograms and iWAM Work Motivations

The iWAM Patterns

Construction of the iWAM instrument

Reliability and validity studies on the iWAM instrument

Chapter 3 – Trialling the iWAM instrument with Applicants to the Bachelor of Medicine

program

Study 1: Applicant Sample

Participants

Instruments

Procedure

Data analysis

Results

Discussion

Summary

Contents

Chapter 4 – Critical Work Motivations of medical students

Study 2: Medical student sample:

Introduction

Methodology

Participants

Instruments

The Satisfaction with the choice of medicine as a career
questionnaire

Procedure

Medical student grades: academic and clinical performance data

Data analysis: medical student sample

Results

Research Question 1(a)

iWAM as a predictor of satisfaction

Relationships between individual satisfaction questions and iWAM

Satisfaction questionnaire factor analysis

Relationships between the satisfaction factors and iWAM

Critical metaprograms and relationships with satisfaction items

Research Question 1 (b)

iWAM as predictor of academic achievement

Correlations between iWAM metaprograms and academic
achievement

Critical metaprograms for academic achievement for Years 2-4

Contents

Chapter 4 – Critical Work Motivations of medical students (cont.)

Question 1(c)

iWAM as predictor of clinical performance

Correlations between iWAM metaprograms and clinical performance

Critical metaprograms for clinical performance

Summary table of the critical metaprograms across the three outcome areas

Research Question 2:

Change in critical metaprograms over five year program

Research Question 3:

Critical metaprograms and demographic variables

Final models for satisfaction, academic achievement and clinical performance

Discussion

Summary of medical student study result

Chapter 5 – Implications for study findings

References

Contents

Appendices

Appendix A: Theoretical basis for each of the iWAM metaprogram categories

Appendix B: (iWAM) HR Summary Report

Appendix C: (iWAM) Information Analysis Report

Appendix D: (iWAM) Personal Graph

Appendix E: (iWAM) Attitude Sorter Wheel

Appendix F: Applicant sample consent form

Appendix G: Applicant invitation letter

Appendix H: Applicant email instruction letter

Appendix I: Medical student consent form

Appendix J: Medical student invitation letter to Years 1 to 3

Appendix K: Medical student email invitation letters to Years 4 and 5

Appendix L: The iWAM (hard copy) questionnaire

Satisfaction items and iWAM Work Motivations: Correlation matrix

I: Satisfaction factors and iWAM Work Motivations: Correlation matrix

- List of Tables -

Number	Title
Table 3.1	Applicant sample and gender
Table 3.2	Applicant sample: country of origin
Table 3.3	Applicant sample: Worked/Not Worked
Table 3.4	T tests of iWAM Work Motivations between Worked and Not Worked applicant sample groups
Table 3.5	T test Worked and Not Worked groups for Question 1
Table 3.6	T test Worked and Not Worked groups for Question 2
Table 3.7	Thematic analysis of applicant explanation for how they answered the iWAM questions: Worked and Not Worked groups
Table 3.8	Applicant Not Worked group: the basis on which the iWAM questions were answered
Table 4.1	Study hours per week by year of the Bachelor of Medicine program
Table 4.2	Study hours and working hours
Table 4.3	Country of origin of medical sample
Table 4.4	Significant correlations between satisfaction with career choice questions and iWAM Work Motivations
Table 4.5	The five factor solution
Table 4.6	The relationship between the satisfaction with career choice items, their subscales and the five satisfaction factors

Table 4.7	Significant correlations between career choice satisfaction factors and iWAM Work Motivations
Table 4.8	Regression models between the career choice satisfaction questionnaire items and the iWAM Work Motivations
Table 4.9	Critical Work Motivations and satisfaction with career choice factors
Table 4.10	Critical Work Motivations for predicting career choice satisfaction in the Bachelor of Medicine program
Table 4.11	Academic scores by year of the Bachelor of Medicine program
Table 4.12	Correlations between academic achievement Years 1 to 4 and iWAM Work Motivations
Table 4.13	Correlations of iWAM Work Motivations with Years 2 to 4 academic achievement scores
Table 4.14	Critical Work Motivations for academic achievement Years 2 to 4
Table 4.15	Clinical performance by year, Bachelor of Medicine program
Table 4.16	Significant correlations clinical performance (Years 2 to 5) and iWAM Work Motivations
Table 4.17	Regression model clinical performance (Years 2 to 5) and the 48 iWAM Work Motivations
Table 4.18	Summary of critical Work Motivations for the three outcome areas
Table 4.19	Final model predicting career choice satisfaction in the Bachelor of Medicine program
Table 4.20	Final model predicting academic achievement in Bachelor of Medicine program

- Table 4.21 Final model predicting clinical performance in the Bachelor of Medicine program
- Table 4.22 Summary of predictors for career choice satisfaction academic achievement and clinical performance in the Bachelor of Medicine program
- Table 4.23 Changes in critical Work Motivations for career choice satisfaction, academic achievement and clinical performance from Years 1 to 5
- Table 4.24 Comparison of the means of Indifference (N2) for Years 1 to 5
- Table 4.25 Comparison of means of Convinced by Consistency (Co7) for Years 1 to 5
- Table 4.26 Comparison of the means of Convinced by Reading (Co3) for Years 1 to 5
- Table 4.27 Comparison of the means of Present (TP2) for Years 1 to 5

- List of Figures -

Number	Title
Figure 3.1	The Feedback Questionnaire
Figure 4.1	Medical sample participants by year of the Bachelor of Medicine program
Figure 4.2	Gender and working hours
Figure 4.3	Study hours and gender (Years 1 to 5)
Figure 4.4	Scree plot for the iWAM factor analysis
Figure 4.5	Spread of academic marks (Years 1 to 4)
Figure 4.6	Spread of clinical performance scores (Years 2 to 5)

- Abstract –

Understanding and predicting human behaviour and subsequent performance constitutes a large part of organisational literature and at the heart of organisational behaviour lies human motivation. Work motivation, which has been previously demonstrated to be predictive of work performance, job satisfaction, organisational commitment and longevity in a role is applied to a new context in this study, that of the selection and training of future medical doctors.

The application of work motivations to the medical role is contextualised within the ongoing medical selection debate, where current approaches to recognising and selecting the best applicants to be future doctors are critically evaluated. Here, cognitive testing (including academic marks and aptitude testing) which is used as the primary method for medical selection, has been found to be moderately predictive of academic performance, but poorly predictive of clinical performance and later practitioner performance and satisfaction. Research efforts to further define personal attributes associated with good student outcomes have revealed a plethora of traits, with the Conscientiousness dimension of the 'Big 5 traits' achieving high levels of predictive validity. However, while a strong predictor of academic performance, it also has been unable to predict clinical performance in medical students. Therefore, while current selection methods have been demonstrated to be moderately effective, predictors of clinical performance and practitioner satisfaction are poorly covered in the research. Additionally, the medical literature reveals a significant gap in understanding and applying current motivation research to the prediction of medical student outcomes.

This study addressed the research question of whether specific clusters of work motivations may be predictive of clinical and academic performance outcomes and career choice satisfaction in medical students. It also trialled a work motivational screening instrument for its capability to identify complex sets of motivations associated with medical school performance and for its validity for use with both applicants to medical school and existing medical students.

The results of the study have demonstrated that specific clusters of work motivation patterns do exist in medical students which are able to predict both good and poor performance in clinical and academic areas and career choice satisfaction. Additionally, the instrument (inventory for Work Attitudes and Motivations) has been

found to be a valid instrument to identify and measure work motivations in both medical school applicants and medical students.

The identified critical Work Motivations for each of the outcome areas are discussed and applied to medical selection, education and practice, including offering specific advice to medical educators on how to coach students in critical motivations that impact upon student outcomes. Overall, this study has demonstrated that a more targeted testing of specific motivations, shown to be associated with good and poor outcomes in the medical program, may further refine current medical selection procedures.

1

Work motivations and medical student selection

Understanding what drives human behaviour and predicting subsequent performance is an age-old interest, traceable back to the days of the ancient Greek philosophers. Some of the greatest minds in history have struggled to understand and further our knowledge of human behaviour including Aristotle, Plato, Freud, Jung and Maslow. In the workplace, explaining and measuring behaviours that result in performance outcomes constitutes a large part of organisational literature and at the heart of organisational behaviour lies human motivation (Ryan & Deci, 2000).

This study examines the relationship between motivation and critical work outcomes. While this may be thought to be universal in its applications, this study researches the associations between work motivation and performance outcomes in a vocational area where it has not been previously studied – in the selection and training of medical doctors. The study first explores current thinking, approaches and research associated with the medical selection process, in Australia, the UK and the US. This is critically evaluated against the significant body of literature which has defined the attributes that constitute a competent and humane doctor. The extent to which these attributes are being recognised and measured in current medical selection methods, and the effectiveness of these methods to recognise and predict good outcomes in medical school, are also evaluated. Recommendations for refining current medical selection approaches through the inclusion of motivation testing are then proposed, within the framework of work motivation theory.

Current issues associated with the medical selection debate

In 2002, the British Medical Journal website (www.bmj.com) posted two questions to the international community. Firstly, 'what makes a good doctor?' and secondly, 'how can we make one?' Despite the apparently poor choice of the adjective 'good', over 70 qualities were supplied that captured communities' expectations of what it takes to be a good doctor. Interestingly, these responses heavily emphasised personal attributes and included notions such as humanity, empathy, compassion, understanding, honesty, commitment, creativity, respect and a sense of justice.

The common themes emerging from this poll were that first and foremost, a good doctor would be a good human being, a person who genuinely likes and wants to help people (bmj.com). The authors (2002) noted that how to make a good doctor presented a greater challenge than how to define one. However, the general consensus amongst respondents was that healthcare systems around the globe were failing to produce good doctors.

These two issues lie at the heart of a contentious debate that has continued within medical, academic and community circles for over 30 years. As Powis (2008) notes, this issue is rarely out of the newspapers. However, despite lively debate and an extensive body of research into the effectiveness of a large range of selection criteria and procedures, how best to select future doctors remains ill-defined and lacks consensus. McManus, Powis, Wakeford, Ferguson, James & Richards (2005) point out that underlying the selection debate are issues of fairness and equality of access by all cultures and social groups to medical placements. They note that current admission methods in the UK encourage social exclusion.

Medicine is one of the more over-subscribed university programs and the competition for places is intense. For example, at the University of Newcastle, NSW, 110 places are offered annually from a pool of over 2,500 applicants. The importance of assigning places to those who will be ethical, competent, satisfied and a natural fit with the role is critical. This places significant pressure on university admission committees to employ only the most effective and just approaches, to identify those most suited amongst the large pool of applicants.

Medical selection processes are also subject to high levels of community interest. Given the trust invested by the community at large in the competence and moral values of doctors and the expectation that doctors will be effective role models and leaders within the community, there is a high public demand for input into how these individuals are selected (Watts, 1990; Kumana, 2006). In Australia, recent newspaper reports of extreme medical negligence and unethical practice have refuelled community interest in selecting individuals of the highest calibre.

Another aspect of the medical selection debate involves the financial aspects of training medical doctors. In Australia, it has been estimated that the cost of training one medical doctor to the point of graduating from medical school is \$250,000 (personal communication, Dean of Medicine, University of Newcastle, February, 2009).

The personal costs to medical students who fail or withdraw from medical programs, combined with the high monetary costs to the public purse, add further impetus to the importance of medical selection decisions. Given the high stakes associated with medical selection procedures and the lack of clarity currently surrounding these processes, McManus et al. (2005) suggest that the starting point for bringing resolution to the medical selection debate centres in defining evidence-based selection procedures that grow out of a clear definition of the type of student to be selected and why, with procedures that are legally defensible and offer equality of access to all cultures and social groups.

Current research and commentary on the 'good doctor'

The medical literature abounds with descriptions of the 'good doctor'. In fact, a review of medical admission processes in the US by Albanese, Snow, Skochelack, Huggett & Farrell (2003) found that 87 different personal qualities relevant to the practice of medicine had been identified including integrity, empathy, tolerance for ambiguity and logical reasoning abilities.

Any discussion on essential prerequisites for competent medical practice has traditionally focused on the primacy of intellectual aptitude. These components include critical reasoning ability, good spatial perception, non-verbal analytical skills and crystallised intelligence, which comprises intelligence as knowledge and general culturally acquired knowledge (McManus et al., 2005).

However, many authors argue that being a good doctor requires more than intellectual achievement and passing exams in medical school (Dickman, Sarnacki, Schimphauser, 1980; Best, 1989; Reede, 1999; Barzansky, Friedman & Arnold, 1993; Hobfall & Benor, 1981; Mitchell, 1990; McManus et al., 2005). Gordon (2003) describes good doctors as altruistic, accountable people with a sense of duty, integrity and an intrinsic respect for people. This description suggests an individual who is involved in and motivated by a career that serves humankind. Other authors similarly describe higher, guiding values such as integrity and probity (McManus et al., 2005), social conscience (Reede, 1999) responding to society's needs and humanistic values (Stoddard, Hargraves, Reed & Vratil, 2001) and ethical behaviour (Munro, Bore & Powis, 2005). Given these underlying values and behaviours it is perhaps not surprising that Murden, Galloway, Reid & Colwill (1979) found that high levels of maturity seemed to be a prerequisite for excellent performance as a clinician.

While operating from a position of integrity and humanistic values, good doctors are also seen to possess a focus on people and a developed range of interpersonal skills in communication. The UK Department of Health (2004) describes the pivotal importance of selecting and training doctors of the future who will put their patients first and who possess an awareness of how their professional practice influences the patient experience. These attributes are also cited by Murden et al. (1979) who focus on the primacy of the doctor–patient relationship as the hallmark of successful medical practice and Reed, Jernstedt & McCormick (2004) who also describe good doctors as those who communicate well with their patients and encourage their involvement in decision-making processes. Munro, Bore & Powis (2008) also affirm the importance of forming mutually satisfying therapeutic relationships with patients and other professionals.

The centrality of empathy in facilitating the doctor–patient relationship has been well validated by a large volume of research being acknowledged as a significant personal attribute in competent and caring practice (Powis & Bristow, 1997a; Streit-Forest, 1982; Albanese et al., 2003; Austin, Evans, Goldwater & Potter, 2005; Munro et al., 2005).

While these highly developed personal attributes may underlie humane medical practice, personal strength, with a strong and sustained motivation to become a doctor, is also seen as necessary to negotiate the challenges of a medical training program and for later retention in the medical profession (Murden et al., 1979; Powis & Bristow, 1997; Albanese et al., 2003; UK Department of Health, 2004; McManus et al., 2005; Parry, Mathers, Stevens, Parsons, Lilford, Spurgeon and Thomas, 2006; and Trapmann, Hell, Hirn & Schuler, 2007). Similarly, attributes of planning, organisation, drive and perseverance, have been found to be significant in a successful medical school experience and becoming a good doctor (Ferguson, James & Madeley, 2002).

The literature, then describes a range of intellectual, personal and interpersonal attributes believed to contribute to a competent, humane and ethical medical practitioner, but to what extent are these notions incorporated into current selection processes?

Current selection processes

Australia

The majority of undergraduate Australian medical schools select future medical students from those who have reached a threshold of academic scores in the Higher School Certificate examination (NSW, or its equivalent in other states), their performance in the Undergraduate Medical Admissions Test (UMAT) and their performance in a structured interview (Powis, 2008).

At the University of Newcastle, academically eligible applicants who meet the threshold scores in UMAT are then invited to attend a structured interview process, which measures a range of personal qualities believed to be critical to medical student performance (Powis & Bristow, 1997a). The interview process, conducted by a trained faculty member and community member, involves an assessment of the applicant's perseverance, tolerance of ambiguity, supportive behaviour/empathy, motivation to become a doctor, self confidence and personal effectiveness (Powis et al., 1997a). The applicants are ranked from 1 to 5 on their suitability in each of these fundamental areas. To be eligible for entry to the program applicants are required to achieve a score of 3 or better.

Those Australian medical schools who conduct a graduate medical training program utilise the Graduate Australian Medical School Admissions Test (GAMSAT). This test is used to ensure that the applicants possess the prerequisite knowledge and skills for the medical degree programs and measures general mental ability, reasoning in biological and physical sciences and more general skills in critical thinking, problem solving and writing (McManus & Powis, 2007).

These universities make selection decisions based on academic achievement in a first degree, with a structured interview process that assesses essential personal qualities. The balance between the three elements (GAMSAT, academic achievement in a first degree and the structured interview process) differs between the schools, but fundamentally resembles the undergraduate approach to selection.

UK

In the UK, undergraduate medical schools place primary emphasis on academic performance, focusing on A levels and recently a national cognitive ability test known as United Kingdom Clinical Aptitude Test (UKCAT).

Evidence of other personal qualities are sought from a personal statement, a teacher reference and interviews (Ferguson et al., 2002).

Graduate entry medical programs in the UK require a previous degree and attainment of threshold scores in the GAMSAT. Once again, interviews for personal qualities are conducted by some medical schools, with the weight ascribed to each of these areas varying between admission committees.

USA

In the USA, it has been estimated that up to 80% of the admissions decision is based on academic grades with the weight of these grades varying between schools (www.medschoolready.com/app/requirements.asp). While some medical schools place very heavy emphasis on the Medical College Admissions Test (MCAT), other schools do not note the MCAT scores unless they are very low, placing their emphasis on extra-curricular activities and an application that is well-rounded. Selection methods include Grade Point Average (GPA), MCAT scores, application material, letters of recommendation and the personal interview.

A similar approach to selection is seen among the 17 Canadian medical schools. In both the US and Canada medicine is studied as a postgraduate degree.

The selection Interview

Interviews have been used widely within medical schools for assessment and selection. Vargo, Madhill & Davidson (1986) suggest that the popularity of the interview has grown out of the recognition that non-cognitive as well as academic ability of applicants needs to be considered in the selection of future doctors. However, despite this, the interview is regarded as a controversial procedure in medical student admissions and one that is surrounded by significant debate (Posthuma & Noh, 1990). The concern expressed with the interview process may relate to the contradictory evidence that has emerged on the reliability and validity of the interview, which in part reflects the structure and design of different interview formats (Roberts & Porter, 1989; Posthuma & Sommerfreund (1985) and Harasym, Woloschuk, Mandin & Brundin-Mather, 1996). In a comprehensive review of the value of a wide range of selection interview formats for medical, dental and allied health professions Morris (1999) stated that overall, the evidence for the interview is confusingly equivocal.

Multiple criticisms have been directed towards the interview in medical admissions. These include the significant resources involved with administrative

staff, interviewer and candidate time and expenses and the training of interviewers (Posthuma & Noh, 1990; Gabard, Porozio & Braun, 1997). Critics of the interview process also argue that interviewers are subject to being influenced by the physical appearance of the candidates (Nayer, 1992) and the persuasiveness of applicants with good social skills who may present an inaccurate image of maturity, motivation or empathy (Seymour, McDougall, Wadsworth & Sanders, 1982). Further issues focus on the ability of interviewers to elicit and interpret necessary information, particularly in a limited time frame (Posthuma & Noh, 1990).

As the interview is inherently subjective by its nature, a number of authors have questioned its fairness and objectivity (Lazarus & van Niekerk, 1986; Posthuma & Noh, 1990). However, a number of researchers argue that subjectivity in the interview process may be reduced by utilising standardised, structured interview formats (Greenwald & Wiener, 1976; Killip, Fuller & Kerber, 1979). Further, the training of interviewers has also been found to reduce subjectivity (Seymour et al., 1982).

Roberts & Porter (1989) propose that there is a general assumption that because the selection interview is widely used, that it is a valid applicant evaluation tool, but the evidence supporting the reliability and validity of interview content is confusing. For example, Mann (1979), who conducted a three year evaluation of interview methods, found significant differences in interviewers scoring methods and Markert & Shores (1981) showed that a candidate's chance of being selected depended more who interviewed them than the specific selection criteria under evaluation.

A number of studies have focused on the predictive validity of correlating interview scores with future medical course performance. Posthuma & Sommerfreund (1985) studied the correlation between interview ratings and first-year academic performance and found that the correlations between these variables were non-significant. Conversely, Powis, Neame, Bristow & Murphy (1988) in studying the predictive value of the Newcastle medical selection structured interview, found that those students who failed to complete the medical program had scored significantly lower in the selection interview than their more successful peers. The authors argued that the successful students had demonstrated greater motivation and perseverance, which had been recognised and documented during the selection interview.

Further support for these findings has been demonstrated by Balogun (1988), who investigated the predictive ability of academic and semi-structured interview admissions scores upon both academic and clinical performance.

While the interview was not able to predict academic grades it did however predict clinical performance, accounting for 34.6% of variance. This may be seen to be a logical assumption given that the interview assessed non-cognitive attributes that are more likely to be demonstrated in clinical practice. However, contradictory evidence is provided by Murden, Galloway, Reid & Colwill (1978); Walker, Killip & Fuller (1985); Balogun (1988) and Benzies- Levine, Knecht & Eisen (1986) who found that semi structured interview scores did not significantly correlate with either academic or clinical performance. This evidence may lead observers to conclude that the differing content and structure of the interview process may lead to the widely varying results in the predictive ability of this selection method.

In Australia, the structured interview format, where interviewers are trained and rate candidates independently, has been shown to be a valuable part of the medical selection and able to predict the students most likely to fail or withdraw (Neame, Powis & Bristow, 1992). However, the ultimate value and predictive potential of medical selection interviews remains an area of continuing debate.

Multiple Mini Interview (MMI)

The multiple mini interview (MMI) developed in Canada in 2001, is a round of short, structured interviews which are used to assess candidates' personal qualities, such as reliability, self-directedness, responsibility, compassion, altruism, collegiality, willingness to work hard, and teamwork (Eva, Reiter, Trinh, Wasi, Rosenfeld & Norman, 2009). Each of the MMI interview segments commences with a two minute period, during which the candidate is given a question or scenario to read. During the subsequent interview the candidate is allowed eight minutes of dialogue with one interviewer (in some cases, there may be a third party observer). Following the interview, the assessor utilises the following two-minute period to evaluate the candidate, as they then move to the next scenario. This cycle is repeated through ten stations, over approximately two hours.

The MMI has been derived from the OSCE (objective structured clinical examination) used by many undergraduate medical programs to assess medical students' clinical skills and knowledge. According to Eva, Reiter, Rosenfield & Norman (2004b) studies at the University of Calgary have demonstrated that the most reliable data on medical student performance is achieved by an interview procedure using multiple assessments and multiple assessors. Further, the authors argue that fairness in scoring during medical selection interviews is increased with many scores are collected on the same candidate by multiple interviews as opposed to a number of interviewers on a panel for one interview.

According to Hofmeister, Loker & Crutcher (2009) the MMI has been subjected to significant testing and validation over a seven year period. McMaster University in Canada began research and development of the MMI in 2001, with the aim of positively predicting future medical student performance and post graduate training performance.

According to Eva, Reiter, Trinh, Wasi, Rosenfeld & Norman (2004b) and Eva, Reiter, Trinh, Wasi & Rosenfeld (2009), a large study conducted at the McMaster University in 2002, revealed an overall test reliability of ($r = 0.81$) for the MMI, with subsequent studies demonstrating similarly high test reliability. The authors also pointed out that student follow-up through the medical program and then to national licensure examination, revealed the MMI as the best predictor of post graduate clinical performance and professionalism (Reiter, Eva, Rosenfeld & Norman, 2007), communication skills with patients (Hofmeister, Loker & Crutcher, 2009).

A number of authors have testified to the advantages of the MMI format. For example, it has been proposed that the MMI requires less expenditure and resources to administer (www.ProFitHR.com). It is also argued that the MMI format is less discriminatory of gender and racial minorities than the traditional interview formats (Eva, Reiter, Rosenfeld & Norman (2004b); Moreau, Reiter & Eva (2006). Additionally, Griffin, Harding & Yeomans (2008) found that preparatory courses taken by the candidate prior to the MMI tend to not influence the interview results. Further, the MMI allows multiple opportunities to witness a candidate's abilities. Eva, Reiter, Trinh, Wasi, Rosenfeld & Norman (2004b) state that MMI stations can be structured to recognise and select students with the personal characteristics desired by the medical school. Also, candidates may feel more confident in the interview process as they are given a chance to recover from a station where they have performed poorly by moving to a new, independent assessor.

By 2008, the MMI had been adopted as a medical admissions test by the majority of medical schools in Canada and a number of medical schools in Australia, Israel and the USA (Hofmeister, Loker & Crutcher, 2009). However, while the MMI is gaining international interest, further predictive evidence is required to establish it as superior to the structured interview formats used in the majority of medical schools in Australia.

The predictive ability of academic criteria in medical selection procedures

In the UK, the US and to a lesser but still significant extent in Australia, primary emphasis has been placed on academic and intellectual capability in

selection procedures. To what extent does previous academic prowess contribute to overall medical school performance and identified notions of what constitutes a 'good doctor'? The precedent of reliance upon academic criteria has been based on research that demonstrated that academic marks in a previous exam would be the best predictor of medical school performance (McManus et al., 2005).

Research supporting the efficacy of academic criteria in predicting later medical student performance includes a meta-analysis conducted in the US by Burton & Ramist, (2001) who estimated the overall predictive validity of high school grades to subsequent university grades at $r=0.42$. In Europe, researchers Trapmann et al. (2007) studied the validity of specific academic admission tests in German-speaking countries, finding a correlation coefficient of $r= 0.48$ between academic selection criteria and medical school academic performance. They also reported a predictive validity of German high school grades to subsequent German medical school grades as 0.53. While in the UK, a longitudinal study of 79,000 18-year-old students entering university between 1997–2001, found a significant, but unspecified relationship between A level grades and university performance (www.hefce.ac.uk).

Ferguson et al. (2002) found that overall, 23% of the variance in the medical school performance can be predicted by previous academic performance, and these results are reinforced in a study by Tross, Harper, Osher & Kneidinger (2000) who similarly demonstrated that 25% of variance in predicting academic performance at university could be explained by the pre-admission GPA score.

These results demonstrate that while there are some differences in research results depending upon the specific academic criteria being studied, overall prior academic achievement is able to moderately predict later academic achievement in university and medical school grades.

A number of authors in the field of medical selection have asserted that selection should not be based on academic criteria alone, stating that students that have the most superior pre-admission academic history are not likely to perform better as a physician than those with lesser records. For, despite proven intellectual ability, some students continue to fail, withdraw, earn low academic and clinical exam grades, experience dissatisfaction in the role, behave unethically or respond with high stress levels (Reede, 1999; Barzansky, Friedman & Arnold, 1993; Hobfall & Benor, 1981; Mitchell, 1990; Rhodes, Gallemore, Gianturco & Osterhout, 1974).

These responses suggest poor person job fit with the role, which is not accounted for using cognitive or academic testing alone in medical selection processes.

At the University of Newcastle, a longitudinal study between 1978 and 1988 employed a double pathway method to trial the traditional academic method of selecting medical students with an innovative approach which utilised a written admission test, a structured interview process to evaluate five critical personal attributes and a lowered academic threshold.

The research conducted during the selection process demonstrated that academic marks in the top 1% were not predictive of success in the program (Neame, Powis & Bristow, 1992). The authors additionally found that there was no significant difference in the achievement within the program between those in the top 1% and those admitted from the top 10%. Powis et al. (1997b) also reported that those that had been excluded by the structured interview process were almost exclusively from the applicants who had attained academic scores in the top 1%. The research concluded that the top 10% of academic scores, and those with a credit average in a past tertiary degree, provided sufficient academic base to cope with the demands of the course (Powis et al., 1997b).

The predictive validity of university admission and aptitude testing

McManus et al. (2005) note that the use of intellectual aptitude tests in medical selection is burgeoning. Examples of such tests include the Graduate Australian Medical School Admissions Test (GAMSAT) and the University Medical Admissions Test (UMAT) both used in Australia; Medical College Admission Test (MCAT) used in the UK and the US; Graduate Record Examination used in the US; and the Scholastic Aptitude Test (SAT) used in Europe. These processes are seen as alternatives to high school examinations and are designed to measure intellectual capabilities for reasoning and thinking, with emphasis on logical and analytical reasoning abilities.

A number of research studies and meta-analyses have examined the predictive potential of the most widely used aptitude and university admission tests in Europe, the UK and the US. In Australia however, there has been no peer-reviewed research into the predictive validity of the widely used UMAT. Similarly, the graduate entrance GAMSAT used in Australia, the UK and Ireland, was not able to predict in course academic performance in medical school (Powis, 2008) and was

additionally found to be a negative predictor of clinical reasoning ability (Groves, Gordon & Ryan, 2007).

Ferguson et al. (2002), in a comprehensive review of the predictive validity of a number of UK selection processes, found that the correlations between pre-admission tests MCAT, GPA, A levels and undergraduate medical performance was $r=0.48$. Similarly, a meta analysis conducted by Kuncel, Hezlett and Ones (2001) calculated mean correlation coefficients between different parts of the GPA of up to $r=0.49$, while Burton & Ramist (2001) reported mean correlation coefficients of $r=0.36$ between the Scholastic Aptitude Test (SAT), the Graduate Record Examination (GRE) and medical students' academic performance.

Ferguson et al. (2002) also found that the prediction of postgraduate competence with university pre-admission tests was $r=0.24$. Further, the results indicated that only 6% of the variance in the performance of postgraduate medical students could be explained by pre-admission tests, revealing that this selection method was a poor predictor of 'real world' performance as a physician.

Overall, while moderate correlations have been demonstrated with a range of European and American university admission tests, as Shen (1997) noted, these results relate to medical students' performance in the cognitive domain. A review of literature has revealed that very few studies have been conducted on the association between university admission test scores and subsequent physician performance.

In an early US study, MCAT scores were found to be negatively correlated to clinical performance ratings of physicians by their supervisors (Howell & Vincent, 1967). Additionally, numerous studies have shown that GPA and MCAT scores have very poor correlations with internship performance (Gough & Hall, 1975; Keck, Arnold, Willoughby, Calkins, 1979; Murden et al., 1979; Ferguson et al., 2002). Further, the relationship between the undergraduate GPA and MCAT and success in clinical performance decreases as students move through the Years of the Program (Conger, Fitz, 1963; Gough & Hall, 1975; Mitchell, 1990; Silver & Hodgson, 1997).

While the importance of intellect in undergoing the medical program seems axiomatic, it fails to address the issues of student and physician clinical expertise and most importantly the significant personal attributes associated with maturity,

compassion and humanity expected by the medical profession and the community at large. On this point, McManus (2003) states that most outcome variables in these studies have not been centred on the quality of the doctor–patient relationship. Reede, (1999) observes that MCAT scores, for example, provide very little information on important qualities such as social conscience, interpersonal abilities and integrity. Additionally, Ree & Earles, (1992) note that significant job performance determinants such as individual motivation, physical strength, personality and other non-intellectual components are not accounted for in the field of intellectual testing. Therefore, in predicting future medical student clinical grades and eventual clinician performance another set of predictors would be required to augment academic or aptitude testing.

Personal attributes that may further explain medical student and clinician performance

While cognitive testing offers a moderate to strong prediction of students' ability to successfully negotiate the academic and theoretical component of medical programs, a significant body of research has been devoted to testing a range of non-cognitive factors that may also help to explain variance in medical student performance and satisfaction.

According to Hogan (2005) non-cognitive testing includes personal inventories designed to measure an individual's personality attributes. A number of authors suggest that testing non-cognitive factors, in addition to cognitive factors, could increase fairness in the admission decisions for graduate education because gender and race differences tend to be smaller in non-cognitive factors (Kyllonen, Walters & Kaufman, 2005) and offer less bias towards social class (Lumsden et al., 2005).

A plethora of personal attributes have been studied that may impact upon the medical student experience and performance outcomes. These include empathy (Hojat, Gonnella, Mangione, Nasca, Veloski, Erdmann, Callahan & Magee, 2002 and Streit-Forest, 1982), tolerance of ambiguity (Merrill, Camacho, Laux, & Lorimer, 1994), maturity (Murden et al., 1979) ethical orientation (Munro et al., 2008), perfectionism (Enns, Cox, Jitender & Freeman, 2001), stress (Shen, 1997) and gender differences (Pawelczyk, Pawelczyk & Bielecki, 2007 and Meit, Borges & Early, 2007).

These studies are representative of a large range of studies into the non-cognitive influences that may mediate behavioural and performance differentials between medical students. Currently however, three areas of research are prominent in the medical selection literature. These include the conscientiousness dimension, mental health issues and resilience to stress.

The conscientiousness dimension is one of the Big 5 scales (other dimensions include neuroticism, agreeableness, extraversion and openness to experience) which has been shown to underlie perseverance and academic success. Digman et al. (1981) reported that conscientiousness was a predictor of academic achievement in educational and vocational settings, with correlations consistently being reported in the range of $r=0.50$ to $r=0.60$. Similar findings have been documented by Lievens, Coetsier, De Fruyt & De Maeseneer, 2002; Ferguson et al., 2002; Barrick, Mount & Judge, 2001 and Tyssen et al., 2007.

The two other significant areas emerging in the research are the mental health status of medical students and resilience to stress. Studies have revealed that the Big 5 dimensions of high neuroticism, low agreeableness, low conscientiousness, and introversion (Malouff, Thorsteinsson & Schutte, 2005) with low self-control have been associated with poor mental health (Tangney, Baumeister & Boone, 2004). According to Bore, Ashley-Brown, Gallagher & Powis (2008) recent research suggests that the overall mental health of medical school students is lower than that of the general population. This was evidenced by Knights & Kennedy (2006) who found a significant percentage of Australian medical students registered high scores in more than one dysfunctional syndrome. It was found that 33% of medical students reported perfectionist and obsessive tendencies, 26.4% reported very high levels of indecisiveness and conformity and 10.7% reported extreme tendencies for aggressiveness and self promotion (Knights et al., 2006).

These mental health studies have offered significant insights into the medical school experience and point to the importance of psychological stability and resistance to stress in the screening of future medical students (Bore, Ashley-Brown, Gallagher & Powis, 2008).

Summary of selection procedures

A review of the current medical selection procedures and testing modalities has revealed that university admission committees have heavily emphasised academic and aptitude testing in predicting future medical student performance. The literature clearly

demonstrates that, overall, this testing is effectively predicting academic performance at medical school.

However, in Australia the widely used University Admission tests, UMAT, remains unsupported by peer-reviewed research. Additionally, GAMSAT used in the UK and Australia has not been able to positively predict future academic performance in medical students. Given the reliance that is being placed upon academic predictors, this presents an area of concern. As Ferguson et al. (2002) note, the 'real world performance' of medical students requires a further set of predictors to augment academic and aptitude testing. A number of medical schools in Australia, the UK and the US additionally utilise personal interviews to assess a range of attributes believed to underlie medical school success. However, these interviews vary widely from school to school in both their content and the weight ascribed to interview results.

While a wide range of non-cognitive variables and their influence upon medical student outcomes has been investigated, the notion of (work) motivation has received scant attention. This is puzzling, given that the organisational literature abounds with motivation research and its effects on performance outcomes.

A review of motivation in the medical literature

A review of the relevant medical literature revealed that the motivation to become a doctor and specific qualities that are consistently found in satisfied and motivated medical students have received little attention. This finding was consistent with that of McManus et al. (2005) who, in a review of factors associated with medical school success, found that only 10% of over 500 publications focused on motivational and personality factors.

Medical student motivation has been acknowledged as fundamental to satisfactory outcomes and retention in medical degree programs (Parry et al., 2006; Albanese et al., 2003). Additionally, proponents of the case for personal qualities testing in medical students have long cited the importance of student's motivation in successfully completing the program and performing as a competent and caring doctor (McManus & Richards, 1986; Albanese et al., 2003; Reed et al., 2004; Adams, O'Connell & Gupta, 2006 and Parry et al., 2006).

Over 30 years ago, Rhoads et al. (1974) examined the predictive validity of UK selection criteria for clinical and academic outcomes and concluded that motivation was the most probable determining factor of medical student performance. More

recently, a meta analytical review by Robbins et al. (2004) focused on identifying social and personality factors associated with university student outcomes, to identify any significant psycho-social constructs and to then estimate the variance they may explain. The review demonstrated that motivational constructs are predictive of university students' academic performance above and beyond traditional predictors. These constructs included motives as drives (the need to belong and the motivation to achieve), motives as expectations (self-efficacy and outcome expectations) and motives as goals (academic goals).

These findings, along with recommendations from medical selection authors over the past five years that the future of medical selection should include well researched and validated forms of motivation testing (McManus et al., 2005 and Munro et al., 2008) have provided both the stimulus and the ultimate aim for the present study.

An exploration of the concept and theories of work motivation follows. This in turn acts as the framework for a review of current research into the association and predictive validity of work motivation with a number of critical work outcomes.

The potential application of these concepts to the selection and performance of medical students is then outlined as the basis for the research design for the present study.

What is work motivation?

Definitions of human motivation abound in the literature. Bandura (1977, p. 158) describes human motivation as '... a multi dimensional phenomenon indexed in terms of the determinants and intervening mechanisms that determine the selection, activation and sustained direction of behaviour. The driving or impelling aspect of motivation is captured by the definition given by Kamali, Khan, Khan & Khan (2007, p. 2) as 'the need or drive within an individual that drives him or her towards goal oriented action, the extent of drive depends on the perceived level of satisfaction that can be achieved by the goal'. Similarly, Naylor, Pritchard & Ilgen (1980, p. 159) describe motivation as 'the process of allocating personal resources in the form of time and energy to various acts in such a way that the anticipated effect resulting from these acts is maximised'. Latham & Pinder (2004) summarise definitions of motivation by stating that from a system point of view motivation consists of three interdependent, yet interacting elements: needs, incentive and drives and that the key to understanding the process of motivation lies in the meaning of and relationship among these variables.

Motivation applied directly to the work context may be seen as a psychological process resulting from the interaction between the individual and the environment and more specifically as '... a set of energetic forces that originate both within as well as beyond an individual's being, to initiate work-related behaviour and to determine its form, direction, intensity, and duration' (Pinder 1998, p. 11).

The motivation literature provides a wealth of descriptions of factors believed to underlie, interact with or perpetuate an individual's work motivations. These factors include human needs, values, incentives, goals, cognition, personality traits and national culture. This chapter outlines these factors as potential contributors to understanding the notion of work motivation, later discussing how these factors are expressed in current motivational theories.

Contributors to work motivation

Needs

The concept of human needs is widely accepted and promulgated as fundamental to human motivation (Latham & Pinder, 2004). Here, human behaviour is seen to be stimulated by the urge to satisfy a large array of needs including: innate physical needs (air, water, food, shelter) social needs (relatedness, belonging) innate psychological needs (competence and autonomy) achievement needs (growth, status and recognition) or self actualisation needs (Deci & Ryan, 2000; Latham & Pinder, 2004).

Kanfer (1991) argues the importance of needs as internal tensions that influence mediating cognitive processes that lead to behavioural variability. With the continuing interest in the causation of behaviour, there has been a resurgence of attention and research into needs since 1977, with a number of needs-based motivation theories emerging, based on where the individual's energy is derived and the type of needs an individual is attempting to fulfil (Latham & Pinder, 2004).

Values

Prince-Gibson & Schwartz (1998) describe values as the guiding principles of a person's life, which, like needs, have the capacity to arouse, direct and sustain human behaviour (Latham & Pinder, 2004). While needs are believed to be innate to the individual, values are seen to be acquired through experience and cognition. Latham & Pinder (2004) note that values are closer to action than needs, acting as the criteria with which individuals decide and judge amongst alternative behaviours. Locke & Henne (1986) argue that values are inherent in most work motivation theories, noting

that these theories centre on the influence of one or more specific values, such as fairness on action or on the effects of values in general.

Incentives

Motivation is commonly viewed as the driver that enables managers to encourage employees to achieve their targets. Incentives may be seen as the creation of stimuli in working environments which enable people to perform to the best of their ability in pursuit of organisational success (BNET dictionary). Incentives may be seen as external motivation offered to individuals such as pay increases, promotion or prizes. In the twentieth century, there was an overt shift away from relying on motivation by dictation and discipline towards a motivation of creating an appropriate corporate climate and addressing the needs of individual employees (BNET dictionary).

National culture

Steers & Sanchez-Runde (2002), in attempting to demonstrate the relationship between needs and values, suggest that the national culture determines three distal sources of motivation that may be evidenced in the workplace:

- people's self-concept, which includes personal beliefs, values and needs
- norms on the work ethic and the nature of achievement and locus of control
- environmental factors, including education, socialisation experiences, prosperity and political/legal systems.

These authors conclude that these distal factors influence work motivation levels and an individual's choice of goals, their self-efficacy beliefs and what constitutes incentives and disincentives to perform (Latham & Pinder, 2004).

Goals

Latham & Pinder (2004) argue that people set goals and strategise ways to attain them based on needs, values and the work context. They also develop assumptions about their sense of self and their identity, which in turn affects their choice of goals and strategies.

Traits

According to Mitchell & Daniels (2003) research on personality represents the fastest growing area of interest in motivational research. In a review of predictor domains, Schmitt, Cortina, Ingerick & Wiechmann (2003) found that personality traits are the most frequently used predictor for elements of motivation.

A review of the current research on personality has demonstrated that a number of traits have been shown to predict job choice, work performance and job satisfaction. These traits include extroversion, conscientiousness (Mount & Barrick, 1995), self-

regulatory and self-monitoring strategies (VandeWalle, Brown, Cron & Slocum, 1999), tenacity, core self-evaluations (Judge, Locke & Durham, 1997) and goal orientation (Brett & VandeWalle, 1999). Judge & Ilies (2002) similarly demonstrated relationships between personality traits and three key theories of performance motivation, finding that the Big 5 traits (conscientiousness, neuroticism, extraversion, openness to experience and agreeableness) were important drivers of employees' motivation. Similarly, Erez & Isen (2002) found that individuals with higher levels of positive affect demonstrated higher levels of self-reported motivation, persistence of effort and work performance on two differing tasks.

Motivation theories

Deci & Ryan (2000) state that the field of motivation is concerned with answering questions about the 'why' of human behaviour. The authors describe the study of motivation as the exploration of the energisation and direction of behaviour. Here, energy in motivation theory is fundamentally concerned with needs that are required to remain healthy and those that arise through interaction with the environment. Direction refers to the individual's internal processes that assign meaning to external and internal stimuli, which in turn direct the individual's actions towards need fulfilment.

The field of motivation then, explores all aspects of individual's needs and the processes and structures that relate those needs to behaviours (Deci & Ryan, 2000), while motivation theories then organise the findings of those explorations. The differences in motivation theories arise from where the energy is derived and from the specific needs that are seeking fulfilment. However, most theorists agree that motivation requires the desire and ability to take action and an objective for taking action (Ranfall, 2004).

In commenting upon the plethora of motivation theories that attempt to explain human motivation, Judge & Ilies (2002) note that no one theory can fully or accurately capture this multi dimensional phenomenon. Further, Deci & Ryan (2000) point out that while many pieces of the motivation puzzle have been identified, what is needed is an over-arching integration of theories to provide a more holistic sense of the phenomenon.

To represent motivation theories, the following theories were selected: (i) needs based theories, (ii) goal-setting theory, (iii) expectancy theory and (iv) self-efficacy theory. These were selected from a large range of theories as those theories most

favourably reviewed in the academic and managerial literature and as being widely accepted, popular and having current applicability to workplace practice.

(i) Needs based theories

Several theorists, including Maslow, Herzberg and McClelland have proposed theories that draw upon human needs as a source of motivation. Latham & Pinder (2004) state that in the management context, the most popular explanations of motivation are based on fulfilling the needs of the individual.

Maslow's hierarchy of needs (1954)

This traditional theory, focusing on individual needs, has experienced a resurgence of attention amongst motivation researchers (Latham & Pinder, 2004). Maslow proposes that five levels of human needs must be satisfied for an individual to be healthy and well adjusted. To reach full potential, all five levels of needs must be satisfied starting with the lowest needs (air, water, food and shelter) to the highest need of self actualisation. Other needs include safety, social and self esteem needs (Di Cesare & Sadri, 2003).

Maslow's theory asserts that workers are motivated by all these needs. Support for this theory is provided by Greenberg & Baron (1997) who argue that unless all workers' needs are satisfied on the job they will not perform effectively. The practical application of Maslow's theory to current work contexts is evidenced by organisations' attention to physical elements of work, including lighting, ventilation, space, overall working conditions, safe work practices and regulations. Additionally, higher needs are catered for by the social and affirmative focus on cohesive work teams, with self esteem needs met through responsibility and recognition and the opportunity for reaching self-actualization in career advancement and achieving creative and challenging projects (Di Cesare & Sadri, 2003). Ajila (1997) and Kamalanabhan et al. (1999) state that Maslow's theory is widely accepted as foundational to employee motivation.

McClelland's theory of needs (1961)

McClelland (1961) proposes that people are not primarily motivated by the concept of reward. The McClelland theory of needs states that each person has three categories of need that exist in varying degrees. It is the combination of these three needs that explains our individual levels of drive and our preferred sources of

motivation. These needs include the need for affiliation, the need for achievement and the need for power.

McClelland (1961) also proposes that when employees are assigned tasks that do not match their motivational profile they will become subconsciously de-motivated by their work. Similarly, when supervisors use communication styles which are not congruent with their employees' primary motive they may again become subconsciously de-motivated (McClelland, 1961).

Herzberg's two factor theory (1959)

Herzberg's two factor theory focuses on intrinsic and extrinsic work motivators and their effect on job satisfaction. The Herzberg theory arose from the analysis of critical incidents which resulted in workers experiencing either positive or negative responses to their work situation. Herzberg found a strong association between two sets of factors, namely extrinsic and intrinsic motivators and job satisfaction.

Herzberg (1959) describes extrinsic factors as those related to the work environment, including elements such as: company conditions and policies, pay and the quality of collegial relationships and supervision. These factors are also termed Hygiene factors. Herzberg (1959) found that if these fundamental facets of work were not met, high levels of dissatisfaction would ensue. The intrinsic factors, also termed Growth factors, include recognition, status and promotion possibilities within an organisation.

Herzberg's theory proposes that both extrinsic and intrinsic factors explain employee motivation. He noted that while an individual's satisfaction with hygiene factors would create average job satisfaction it would not be sufficient to promote a positive motivation to work. To create a positive motivation growth factors would need to be present, by enriching the content of the work such as greater responsibility and skills development (Di Cesare & Sadri, 2003).

While need-based theories explain why an individual must act, they do not explain why specific actions are chosen in a specific situation to gain a specific outcome. They also fail to account for individual differences. Latham & Pinder (2004) note that along with increased recent attention to needs, there was also a resurgence of interest in individual differences, particularly with regard to the effects of job characteristics on employee motivation.

More recent theories

According to Latham & Pinder (2004) three of the most recent and popular motivation theories; goal-setting theory, expectancy theory and self-efficacy theory, are focused on the prediction of job performance.

(i) Goal-setting theory (1990)

Goal-setting theory is based on the notion that motivation results from establishing specific, concrete goals which help to guide and direct behaviour. Presented by Locke & Latham in 1990, the theory is derived from Aristotle's idea of final causality, which states that purpose can cause action. Mitchell & Daniels (2003) argue that goal-setting theory is possibly the single most dominant motivation theory, with more than a thousand articles and reviews being published on this topic in the past 30 years.

In demonstrating goal-setting theory, a meta-analysis by Zetik & Stuhlmacher (2002) found that negotiators with specific and challenging goals consistently achieved higher profits than those without goals. The results also showed that consistent with goal-setting theory, the higher the goals applied, the higher the outcome (Latham & Pinder, 2004). However, Lee, Locke & Phan (1997) found when goals are perceived as impossible, offering incentives for the attainment of the goal may lower motivation.

(ii) Vroom's expectancy theory (1964)

Rather than focusing on needs, or goals, Vroom's theory (1964) focuses on incentives. Vroom's theory proposes that behaviour results from conscious choices amongst alternatives that seek to maximise pleasure and to minimise pain. The theory examines the connections among expected behaviours, rewards and organisational goals. This theory of work motivation states that individuals have different sets of goals and are able to be motivated when they believe:

- 1) putting forth more effort will result in better job performance (Expectancy)
- 2) better performance will lead to increased rewards (Instrumentality)
- 3) these organisational rewards will be valued by the individual (Valence) (Greenberg & Baron, 1997).

This theory is demonstrated by organisations seeking to motivate their employees through pay increases and incentives. Di Cesare & Sadri (2003) note that salary is a potent motivator in the western world, where employees will improve their performance in anticipation of monetary rewards.

(iii) Self-efficacy theory (1977, 1986)

Self-efficacy theory is a key element of Bandura's social cognitive theory, promulgated in 1986. According to Bandura (1994), perceived self-efficacy is defined as an individual's belief concerning their capabilities, which produces designated levels of performance that influence events that affect their lives. Self-efficacy beliefs contribute to motivation by determining the type of goals a person will set, the effort they will then expend, the level of perseverance they will demonstrate and their resilience in response to failures. Those with strong self-efficacy will exert greater effort if they fail to master the challenge (Bandura, 1994). Further, self-efficacy has been shown to be predictive of job performance (Latham & Pinder, 2004).

Summary of motivation theories

Motivational theorists offer what may be viewed as disparate frameworks for explaining the process of motivation and its consequent flow-on effects in human behaviour and observable outcomes. However, as Deci & Ryan (2000) note, all motivational theories are built upon one or more of the basic factors believed to be fundamental to the process of generating motivation. These include needs, values, traits, goals, affect, cognition and incentives.

According to Locke & Latham (2004) while all motivation theories offer useful insights into employee motivation, each theory in itself is limited. The authors point out that while there has been a proliferation of motivation theories in recent decades, this has been in multiple directions and what is needed is an overarching theory, or meta theory. The call for the integration of work motivation theory is echoed by a number of authors including Steers, Mowday & Shapiro (2004); Deci & Ryan (2000) and Ranfall (2000).

Perhaps in response to these calls there have been a number of meta analyses in the past seven years in areas germane to work motivation theory, which have begun to bridle this multi dimensional phenomenon (Judge & Iles, 2002; Zetik & Stuhlmacher, 2002 and Locke & Latham, 2004).

Despite their limitations, motivation theories have offered organisations and management systems a framework for understanding employees and for predicting and influencing future behaviour and outcomes (Ranfall, 2000, Green, 2000). Di Cesare & Sadri (2003) note that Maslow's Hierarchy theory (1954), Vroom's

Expectancy theory (1964) and Herzberg's Two Factor theory (1959) continue to be utilised by companies to improve employee motivation and performance in the United States.

The current influence of motivation theories upon organisational management is evidenced in: the use of incentives such as rewarding high performance and punishing low performance (Vroom's theory); focusing on the provision of enriching work and removing barriers to achievement (Herzberg's theory); ensuring that employees' physical and social needs are met (Maslow's theory); setting challenging goals (Goal-setting theory), ensuring people can reach their goals and developing an ideology of attaining goals (Self-efficacy theory).

Steers, Mowday & Shapiro (2004) point out that employee motivation is central in the field of management and this grows out of a general belief that motivation is integral to performance. The authors additionally note that motivation is central to many of the sub areas of organisational behaviour such as leadership, teamwork, performance management, decision making, ethics and change. As such, motivation and motivational theories have received much attention in the research and literature. The next section examines the influence of motivation upon a number of specific work outcomes.

Work motivation and critical work outcomes

A review of the organisational literature revealed that the most common predictor variables associated with work motivation were work performance, organisational commitment, job satisfaction and withdrawal behaviours (absenteeism, lateness and turnover). The relationship between an individual's work motivation and these critical work outcomes is examined.

(i) Work performance

According to Green (2000) motivation fuels performance and without it performance suffers. This is affirmed by Tella, Ayeni & Popoola (2007) who describe motivation as one of the determinants of work performance. Further, motivation is seen to be instrumental in affecting the acquisition of people's skills and abilities and how and to what extent these abilities are used (Locke & Latham, 2004). This may help to explain why gifted people do not always perform well and how, with motivation, individuals are more able to reach or exceed their potential (Green, 2000).

Researchers who have investigated the association between work motivation and performance have found that intrinsic work motivation positively affects an individual's behaviour and work performance (Ryan & Deci, 2000; Brown & Shepherd, 1997). Further, a study by Latham & Pinder (2004) and meta-analyses by Sadri & Robertson (1993) and Stajkovic & Luthans (1998) conclude that self-efficacy, inherent with the self-efficacy motivation theory, significantly influenced individual's work performance.

Further, Judge et al. (1997) and Erez & Judge (2001), in reviewing the relationship between core self-evaluations (manifested in four traits of self-esteem, locus of control, neuroticism and self-efficacy) and work performance, found that motivation mediated almost half of the relationship between these two variables. Erez & Judge (2001) concluded that core self-evaluations are motivational traits, which helps to explain its effect on job performance.

In attempting to explain the determinants of job performance Lawler (1973) suggests that performance is the product of ability, multiplied by motivation. Inherent in this formula is the notion that both elements need to be present for performance to occur. For example, workers who possess 75% ability and 100% motivation are able to perform at an above average level (Kamali et al., 2007). With the heavy emphasis of organisations and selection committees on competencies and perceived abilities, this formula acts as a reminder that the individual's motivation is also a potent contributor to performance.

(ii) Job satisfaction

Job satisfaction has been described as an '... affective reaction to a job that results from the comparison of actual outcomes with those that are desired (Oshagbemi, 2003, p. 1210). Here, the implication is that the particular role is able to provide what is important to the individual. Job satisfaction is an important attribute organisations desire in their workers.

Much of this is based on the explicit assumptions that job satisfaction is a potential determinant of role performance, absenteeism, turnover and extra role behaviours (Oshagbemi, 2003).

Motivational factors contribute to the prediction of job satisfaction. Leach & Westbrook (2000) note that motivation and job satisfaction have been widely investigated, across many work roles and against a number of different theoretical formulations. The authors point out that Herzberg's motivation theory, while considered

non-traditional when introduced in 1959, has become one of the most accepted, known and widely used theories for explaining motivation and job satisfaction. Intrinsic and extrinsic motivators identified by Herzberg (1959) describe two distinct ways of motivating individuals at work. Some researchers argue that extrinsic motivators essentially control employees' satisfaction, for example the nature of the role, the social climate or the remuneration or supervision associated with a role (Adeyemo, 2000; Tella et al., 2007). Other authors argue that intrinsic factors control workers' job satisfaction, where workers deliberately decide to find satisfaction in their jobs and perceive them as worthwhile (Tella, et al., 2007).

Further significant correlations between perceived work motivation and job satisfaction were demonstrated by Tella et al. (2007) in a study of research personnel in academic libraries in the US. These findings are consistent with those of Brown & Shepherd (1997). In examining low levels of job satisfaction, a study by Alexander, Lichtenstein & Hellmann (1998) demonstrated that this phenomenon is associated with leaving a role. Additionally, low job satisfaction has been linked with lethargy and reduced organisational commitment (Moser, 1997). Similarly, other researchers have demonstrated that high levels of satisfaction have been found consistently to have an inverse relationship to an individual's turnover intentions (Abdel-Halim, 1981; Choo, 1986; Rasch & Harrell, 1990).

A review of the literature revealed a gap in specific research which may explain why some people experience high job satisfaction in an environment where other people experience low satisfaction. The individual differences in work motivators may provide a possible explanation to this phenomenon.

(iii) Organisational commitment

In describing the association between work motivation and organisational commitment, Adeyemo (1997) argues that motivation significantly influences the degree of commitment an individual is prepared to expend at work. Kamali et al. (2007) also notes that motivation drives an employee's desire and commitment which is then manifested as effort. Motivation that leads to organisational commitment more directly involves the strength of an individual's identification with and involvement in an organisation. This commitment is evidenced by a strong belief in the organisation's values and goals, a willingness to exert considerable effort for the organisation and a strong desire to maintain membership of the organisation (Mowday, Koberg & McArthur, 1984).

The significance of (work) motivation in determining an individual's organisational commitment has been demonstrated by a meta analysis conducted by Hunter, Schmidt & Jackson (1982). The review revealed a corrected correlation of $r=0.56$ from studies that tested the association between overall work motivation and organisational commitment. Hunter et al. (1982) additionally identified five studies that demonstrated an average corrected correlation of $r=0.69$ between intrinsic motivation and organisational commitment.

Work motivation may be seen as an antecedent to organisational commitment, which in turn significantly influences critical work outcomes. For example, recent research with public service employees demonstrated that as employees' level of organisational commitment increased along a continuum, performance levels also increased (Crewson, 2009). The author also found that in difficult times, individuals with high levels of organisational commitment are more likely than their peers to continue positive participation with an organisation, even under difficult circumstances such as poor supervision or reduced pay.

Further, a review by Mathieu & Zajac (1990) revealed that organisations value commitment in their employees as it is typically assumed to reduce untoward behaviours such as lateness, absenteeism and turnover. This has been demonstrated in a study by Morrow (1983) who found that organisational commitment was able to predict employees' absenteeism, performance and turnover. Similarly, Porter, Steers Mowday & Boulian (1974) found measures of organisational commitment to be better predictors than job satisfaction in discriminating between those who may stay or leave an organisation. This conclusion was also reported by Stokes et al. (1995) who found that an individual's perceived work motivation relates to organisational commitment and the intention to stay with an organisation.

In reviewing the organisational literature, it was noted that these critical work outcomes were often inter-correlated. For example, Latham & Pinder (2004) found that high satisfaction is the result of high performance, which in itself may lead to subsequent high performance only if it is fostered by organisational commitment, and then only if the commitment is focused on challenging goals.

(iv) Withdrawal behaviours

The monetary loss to organisations when losing a critical employee has been estimated as at least one year's salary and benefits, but perhaps the most significant

effect is the loss of accumulated knowledge and expertise, seen as one of the organisation's most valuable assets (Ranfall, 2000).

In a study to determine the impact of self-determined work motivation with police officers, Otis & Pelletier (2005) found that higher work motivation levels were positively correlated with higher reported intentions to remain in the role as long as possible before retirement. The study also revealed that those with high work motivation levels were less likely to experience problems on the job, or minor events that were perceived as irritating. Additionally, the study revealed that fewer problems on the job predicted lower levels of physical symptoms.

Another study of intrinsic work motivation revealed that higher levels of motivation were associated with lower levels of emotional exhaustion and concomitant higher levels of work satisfaction. These were in turn differentially related to turnover intentions (Richer, Blanchard & Vallerand, 2002). Thus, the authors argue that intrinsic work motivation predicts desirable job outcomes.

Motivation is important in the work context because it has been shown to predict work performance, is strongly correlated with job satisfaction and organisational commitment and positively associated with employee retention. Individual differences in what an individual finds motivating at work help to account for the wide variations in behaviours and performance amongst employees, not accounted for by ability. It also helps to explain why high achievers under-perform and leave well paid roles and conversely why others may engage in extra role behaviours or continue in a role under adverse conditions. Further, understanding what motivates an individual at work may provide insightful and strategic information for the selection, management and retention of future employees (Merlevede, 2001, Charvet, 1995).

Applications of work motivations: person–job fit and selection

Behind the concept of work motivation there exists a large body of research on person–job fit. Latham & Pinder (2004) point out that the job environment affects and is affected by a person's needs, personality, motivations and values. The interaction of individual characteristics and those of a work situation, or person–job fit, has been a popular notion in organisational psychology and one that has been heavily researched since the 1940s (Hogan, 2005). According to Caldwell & O'Reilly (1999) the notion of fit between an individual's personal attributes and the demands of a work situation has long been cited as a critical explanation for differences in individual performance and satisfaction at work (Weiss, Davis, England & Lofquist, 1967, Caldwell & O'Reilly,

1999, Sanderlands, Brockner & Glynn, 1988, Epstein 1979, 1980, Holland, 1997). Significant research has been directed towards establishing a link between an individual's personal characteristics and the general characteristics of an organisation (Caldwell & O'Reilly, 1999) and the link between personal attributes and broad job classifications (McClelland & Boyatzis, 1982; O' Reilly, 1977). Motivation may be high or low, depending on the fit between the characteristics of the job and an individual's personal variables. Latham & Pinder (2004) note that motivational researchers have been involved in over 200 studies between 1970 and 1990 researching job characteristics that are determinants of motivational and behavioural outcomes (Ambrose & Kulik 1999).

While there seems to be growing awareness and utilisation of an individual's work motivations as a source for increasing job satisfaction, commitment, performance and retention (Ryan & Deci, 2000; Tella et al., 2007; Green, 2000; Crewson, 2009; Ranfall, 2000 and Otis & Pelletier, 2005), also emerging through the organisational literature is a focus on utilising individual's work motivators as a significant adjunct to selection processes. A number of authors assert the importance of including motivational testing as part of recruitment to ensure a positive fit between the candidate and the role characteristics. These include Charvet (1995), Walton (2007), Konig, Melchers, Kleinman, Richter & Klehe (2007), Munroe & Luck (2004) and Merlevede (2001). The growth of motivational testing in corporate selection has increased exponentially over the past ten years. This is due in no small part to the realisation that competencies and skills alone do not equate to performance without the motivation to drive and channel those skills (Quinn, 2001).

The predictive potential of a range of the most commonly employed selection methods was investigated in a doctoral thesis by Van der maesen de Sombreff (1992). The results demonstrated that motivation and attitudes predicted between 45% to 60% of an individual's later performance in a role. Similarly, competency based selection predicted 45% to 60%, while IQ tests were found to have a predictive job performance potential of 50%. Lower scoring assessment techniques included structured interviews which predicted between 35% to 45% and personality questionnaires which were able to predict 20% to 35% of later job performance. The author concluded that the most effective selection methods would include a combination of both competency and motivation/attitude testing.

Given the impact of an individual's specific work motivations upon subsequent role performance and work experience, it follows that these factors may offer not only

employers, but also university selection committees, vital information about the potential fit and performance of an applicant to a future professional role.

Current assessment of motivation in medical selection

In Australia, the potential impact of an applicant's motivation on future performance is recognised to the extent that it is included in medical selection interviews. Specifically, applicants are asked variants of the question, 'why do you want to become a doctor?'

Hence, the evaluation of applicant motivation is assessed subjectively during the selection interview process. However, while applicants may genuinely articulate their motivation to become a doctor, this may be more representative of a generalised determination within the individual and not reflective of a reliable or quantitative procedure to assess an applicant's motivational fit with the medical role. Additionally, authors note that much of an individual's motivation operates at the unconscious level (Hall, 1997; Charvet, 1995, James & Woodsmall, 1998, Locke & Latham, 2004) and therefore responses to questioning in this area may not be reliable. Motivation is a multi-dimensional area and its assessment requires a more complex approach. This approach may include the identification and measurement of specific work motivations found to be associated with good performance in a role

Specific work motivations and medical student outcomes

Motivation has been shown to mediate performance (Green, 2000; Ryan & Deci, 2000), satisfaction (Chess, Vinokur-Kaplan & Jayaratne, 1994; Tella et al., 2007), commitment (Hunter et al., 1982; Mathieu & Zajac, 1990; Crewson, 2009) and longevity on a role. How might these findings relate to the medical student experience and performance outcomes?

Holland (1997), in explaining the notion of person–job fit, notes that certain clusters of behaviours, values and motivations are linked with success in any work role. Based on the notion of person-job fit, it could be hypothesised that a specific cluster of work motivations may be associated with high performance and satisfaction in the medical student role and, to the extent that individuals deviated from these identified motivators, the work experience may include higher levels of stress, lower performance, lower satisfaction and hold a higher risk of burnout (Boey, 1999, Ellis & Miller, 1993, Furnow, 2002, Harding, 1999, Hart, 1986, Santamaria, 2001, Walsh & Holland, 1992).

Additionally, it could be hypothesised that the clusters of work motivations may define specific outcome areas in the medical student role. For example, high performing students in the academic area may be motivated by gaining knowledge and information, setting goals, planning and scheduling their time and organising and structuring their work. The clinical environment may draw upon complementary or additional different set of motivations. Here motivation to work with and for people may be an important driver along with the motivation to follow rules, procedures and policies.

The following example traces the potential experience of a medical student low in one motivational area in the clinical context. Given that the motivation to follow rules and procedures in the medical clinical environment is important to safe and effective performance, a student with a low motivation to follow rules and procedures may consciously reject the notion of being told how to behave. However, instead of a conscious refusal to follow the rules they may unconsciously filter procedural elements (that are not naturally motivating) out of awareness. Hall (1997) notes that humans can consciously handle only so much information and one of the unconscious filtering mechanisms is to delete information from awareness that is not congruent with one's values and motivations. Hence, the medical student not motivated to follow procedures when placed in a clinical environment that is highly procedural may unwittingly filter out procedural elements. For example, the student may unconsciously re-cap a needle used on a patient and experience a needle-stick injury, or may break asepsis during a procedure without awareness. As the student becomes aware of their deficit in this area it is likely they will compensate by becoming more mindful and conscious of their performance, in case they may overlook a vital step and compromise patient safety (Boey, 1999). Increased conscious focus and attention over a period of time may lead to greater energy utilisation than the student's colleagues, who may be coping more naturally with this area, thus leading to a higher risk of premature fatigue (Wright, Blache, Ralph & Luterman, 1993). Over a sustained period, ongoing higher energy utilisation use may result in minor illnesses, leading to absenteeism.

Eventually, if there is a significant mismatch between an individual's natural work motivations and those that are required to perform well in a role, the individual is likely to lose motivation, perform poorly, fail or withdraw (Wright et al., 1993).

This potential scenario describes a mismatch of one vital motivational area. If, for example, the medical student not naturally motivated to follow procedures was additionally not motivated to work with people, the clinical experience may provide an

additional source of challenge in dealing with patient's emotions and having to expend energy in conversation and interaction. Hence, the medical student role will be associated with a number of areas of practice that require certain motivational patterns and a mismatch in any one of these areas may lead to significant difficulty for the student. The greater the number of areas of mismatch the higher likelihood that performance and satisfaction will be compromised (Tella et al., 2007).

Conversely, when there is a natural fit between an individual's work motivations and those required by the role, an individual may report a sense of ease, comfort or naturalness with the role (Holland, 1997). Because the individual is unconsciously driven to notice and act in ways that are congruent with the role much less extra energy is required. If, for example, a medical student was motivated to follow procedures and was motivated to work with people as in the above example, it would be expected that the student would perform competently, derive satisfaction from undertaking the tasks and retain sufficient energy to form contributory, healing relationships with patients (Hart, 1986).

Researching work motivations in medical students

It is acknowledged that the work motivations of medical students in training may not exactly approximate the motivations of practising medical doctors. However, the clinical experience of medical students, particularly in later years may be seen to offer a window into the motivations of practising clinicians.

Work motivation then, may be seen as a potential, major contributor to medical student performance and satisfaction, which has not been adequately investigated. Motivation has been identified as critical to university student performance (Robbins et al., 2004). While Robbins did not specifically study medical students, the awareness of the centrality of motivation is evidenced in many selection interviews around the globe that are currently subjectively assessing applicant's motivation to become a doctor.

In response to medical selection authors who cite the need for validated tests on motivation (McManus et al., 2005), this study has aimed to investigate the influence of a wide range of work motivations on medical student outcomes. More specifically, the study has aimed to investigate the extent to which students' work motivations may predict academic and clinical performance and career choice satisfaction and, if so, what particular clusters of motivations may be associated with good and poor outcomes in each of these areas.

However, essential to accomplishing this research is a reliable work motivational instrument that is able to identify a complex range of motivations associated with this role.

2

Measuring work motivation

To study the impact of work motivations on medical student outcomes an instrument that could identify and quantify a range of work motivations was required. In this research study, the iWAM instrument was utilised to identify work motivations that may demonstrate a significant relationship with the outcome variables for the study.

(i) Work Attitude and Motivational profile (iWAM)

The inventory for Work Attitudes and Motivations (iWAM) questionnaire was developed in Belgium in 2000, by Patrick Merlevede. The instrument identifies an individual's preferences for work organisation styles, primary areas of interest and motivations and attitudes at work, through the identification of 48 work motivational patterns. After testing and validation procedures, iWAM was released in Belgium in 2001. Since then, the instrument has been utilised in both corporate and academic settings in 21 countries globally, by over 160,000 individuals. The iWAM was released in Australia in 2002 and 64 companies are currently using the instrument in identifying the elements of excellent performance, for assessing person-job fit in selection and team and leadership development.

Background to the iWAM instrument

The developer of the iWAM instrument, Patrick Merlevede, is a statistician and cognitive scientist, with training and expertise in Neuro-Linguistic Programming (NLP). In formulating the iWAM instrument Merlevede has drawn upon foundational concepts from the field of NLP as the basis for the work motivation patterns and the methodological applications of the instrument. NLP is a branch of applied psychology that studies the structure of subjective experience and how thinking produces results (Dilts, Grinder, Bandler & DeLozier, 1980). NLP was developed in the early 1970s by Dr John Grinder, a linguist, and Dr Richard Bandler, an information scientist. They were interested in duplicating the behaviour and effectiveness of people who attained a high level of excellence in a specific area of endeavour. Grinder and Bandler utilised foundational concepts from linguistics and information science with insights from general systems theory and behavioural psychology to develop a methodology known as human modelling. The modelling process involves identifying and describing the important elements and processes that people go through to produce highly skilful or

excellent results. These elements can then be taught to others, so that they may achieve a similar level of excellence as the expert (Bandler, Gordon & Lebeau, 1985).

During the past 35 years the NLP body of knowledge has expanded to incorporate a large number of methodologies and techniques which are based upon modelling and replicating human excellence in areas such as communication, therapy and leadership.

The basis of the iWAM motivation patterns

In devising the iWAM patterns Merlevede (2001) has drawn upon an extensive set of mental filters that have been identified and researched in the field of NLP, known as metaprograms. Metaprograms have traditionally been used in modelling excellent performance processes to help explain how different individuals produce different results based upon their thinking.

According to (Merlevede, 2001) metaprograms are mental filters believed to determine what is motivating to an individual, therefore what is noticed (rather than filtered out of awareness) and which ultimately drive individual's behaviour. As metaprograms form the basis of the iWAM work motivational patterns, a summary of their development is given below.

Background to metaprograms

In the late 1970s, NLP researchers Richard Bandler and Robert Dilts investigated the widely varying responses of clients to the same therapeutic (NLP) interventions. Study results included the identification and labelling of 13 categories of filters, termed metaprograms, that were believed to influence the perceptions, motivations and decision making processes of clients (Dilts et al., 1980).

These metaprograms were later framed by Steward and Bailey in 1982 into an oral screening tool known as the Language and Behaviour Profile, which was subsequently validated by PhD research by Steward (1983) for use in a range of Human Resource speciality areas, such as selection and training. This tool is still currently used globally by management consultants in recruitment, performance building and communications training.

By building upon formulations in general semantics and developments in cognitive and perceptual psychology metaprograms have been tested and expanded by James & Woodsmall, 1988; Dilts, 1990; Charvet, 1995; O'Connor & McDermott, 1995; Hall & Bodenhamer, 1997; Engel & Arthur, 2000 and Merlevede, 2001. Currently 51 metaprogram categories have been identified. A variety of instruments utilise varying metaprogram categories including the Language and Behaviour Profile, (1982)

and the inventory for Work Attitude and Motivations (Merlevede, 2001).

Definition of metaprograms

According to the author of the concept of metaprograms, John Lilly, '... the mind is defined as the sum total of all the programs and the metaprograms of a given human computer, whether or not they are immediately elicitable, detectable, and visibly operational to the self or to others' (Lilly, 1967). Metaprograms are the deepest level, content-free programs that filter our perception, according to James & Woodsmall, (1988) and operate above the content of thoughts. These programs function as the sorting and perceiving rules that govern how we think and emote. They have also been described as the sorting devices or used in perceiving, paying attention to information and inputting and processing stimuli in the external world (Hall & Bodenhamer, 1997). This operating system determines the structure of our thoughts and feelings, directing what we notice or filter out of awareness. Metaprograms are programs that run above everyday thoughts and emotions (Hall & Bodenhamer, 1997).

According to Hall & Bodenhamer (1997), the philosophical basis of metaprogram measures runs counter to psychological labelling and psychological typing. It is built on the philosophy that reducing people to traits, types or personality disorders goes counter to the richness of diversity of the individual. Hall & Bodenhamer (1997) argue that people operate with too much complexity to categorise, label and classify and that people change, grow and learn different ways of being (Hall & Bodenhamer, 1997).

Metaprograms can be recognised in individual expressions, behaviours and in the way one answers questions (Charvet, 1995). The Language and Behaviour profile questions are designed to elicit the structure of a person's metaprograms through the use of a simple interview. The metaprogram patterns provide a blueprint of how the person motivates themselves and in turn how they may approach problems and opportunities. Metaprograms are also used as a means of recognising patterns which control an individual's frame of mind, which in turn provides information on how to effectively communicate and relate to the individual.

Metaprograms have evolved as an instrument in the field of cognitive psychology and have been variously described as 'cognitive styles', thinking styles or patterns of influence (Charvet, 1995). The theoretical basis for the metaprogram patterns is founded in theories and research from the field of cognitive psychology, anthropology and sociology. The specific theoretical basis for each of the metaprogram categories is displayed as Appendix A.

Metaprograms and iWAM Work Motivations

The iWAM instrument has drawn upon 16 of the 51 metaprogram categories (or sets of patterns) that have been identified during the past 30 years in the field of Neuro Linguistic Programming. The 16 pattern categories which were chosen for inclusion in the instrument were based on their applicability to the work context and their suitability to measurement (personal communication with Patrick Merlevede, April 16, 2006). The iWAM questions, while conceptually based on metaprogram patterns, are framed specifically for the work context. In conceptualizing the Work Attitudes and Motivations instrument, Merlevede (2001) points out that motivation was seen as the inner stimulus to behaviour, while the attitude was seen as an observed result of this inner stimulus.

The iWAM instrument organises 48 patterns (within 16 categories) that focus on and measure motivational preferences at work including work organisation styles, primary areas of interest and motivations and attitudes at work that unconsciously drive or motivate individuals towards specific choices and actions. The iWAM patterns will be referred to as Work Motivations.

Appendix B, known as the (iWAM) HR Summary Report, provides a one page overview of the 48 patterns clustered within 16 categories. Here, the score for each pattern is listed within the pattern box and the overall (algorithmically calculated) category score is listed in the category box. Further details on the scoring of the iWAM items are discussed later in this chapter. The 48 iWAM Work Motivations are described in detail below within the 16 pattern categories. A generic description of the iWAM patterns is followed by an example of how each of the Work Motivation patterns may be exhibited in the medical context. The descriptions are adapted from Merlevede & Bailey, (2001).

The iWAM Patterns

iWAM Pattern Category 1: Action Level

The first eight categories in the iWAM are known as the Operating Factors (abbreviated as OF1–8). The first OF category consists of two patterns: Initiation (OF1+), and Reflecting and Patience (OF1-). Each of the eight Operating Factor categories additionally provide an overall score for the category, known as the BP score. For example, the BP1 combination pattern predicts the overall tendency a person has to initiate.

OF1+ Initiation

People who receive high scores in *Initiation* are good at starting a project and do not wait for others to initiate. While these people may be seen to create a lot of activity, the activity may only be associated with the beginning, rather than the completion of a task. Those high in *Initiation* typically do not take time to evaluate consequences of an action and may be seen by others as bulldozing ahead. Situations like sales, business development and acting as an entrepreneur are motivating for those high in this pattern.

OF1- Reflecting and Patience

The person high in *Reflecting and Patience* will be patient and will tend to wait for others to initiate. They work best in roles that are analytical, require understanding and caution. Generally people high in this pattern will prefer to follow rather than lead. Work role examples include a bank teller, police investigator, or sales clerk in a department store.

Application of Action Level to the medical context

Doctors who exhibit high *Initiation* may be at the leading edge of technological developments or pioneering innovation in medical practices. Medical students high in this pattern may have a tendency to act quickly, without duly thinking through the process or the consequences of the action. They may be motivated by surgery and emergency medicine, where they might think and respond quickly. Medical practitioners high in *Reflection and Patience* are not motivated by risk taking, preferring to act with caution and a careful analysis of situations. These practitioners are more suited to areas of medicine where there is time to make decisions, to take into account all the information and where rapid action is not a key element. These areas may include General Practice, Psychiatry and medical research.

iWAM Pattern Category 2: Action Direction

The second OF category consists of two patterns: Goal Orientation (OF2+) and Problem Solving (OF2-). The BP2 combination pattern predicts the overall capability of an individual to focus on their goals over time.

OF2+ Goal Orientation

High *Goal Orientation* (OF2+) refers to people who can stay focused on their goals and think in terms of the goals to be achieved. They may have trouble recognising what should be avoided or what could go wrong.

Those high in this pattern are motivated when they are rewarded for attaining goals. They are well suited for sales, project management, consulting and management roles.

OF2- Problem Solving

High *Problem Solving* refers to people who easily recognise what should be avoided and are motivated when there is a problem to solve. As a result, they may have trouble maintaining focus on their goals because they are easily distracted by problem situations. People high in this pattern are best suited for tasks that involve finding errors and are generally motivated by roles such as auditing, safety and quality control inspection and hardware and software testing.

Application of Action Direction to the medical context

Medical practitioners high in *Goal Orientation* may hold a strong focus on outcomes such as client healing, making a difference through their skills and actions or their future career plans. A high *Problem Solving* focus is central to medicine's charter of 'do no harm'. Problem-based learning is a popular framework for medical education and the motivation to avoid risk, litigation and malpractice underlie medical practice. This pattern may assist with patient diagnosis and management.

iWAM Pattern Category 3: Evaluation Reference

The third OF category consists of two patterns: Individual Motives (OF3+) and External (OF3-). The BP3 combination pattern predicts the overall tendency a person has to decide for themselves, based on their own motivation.

OF3+ Individual Motives

People high in *Individual Motives* are internally referenced individuals who make decisions based upon their own criteria and values and tend to be intrinsically, rather than extrinsically, motivated. They decide about their own work situation and about the quality of their own work and may have difficulty accepting other's opinions and direction. They may gather information from others, but they will ultimately decide for themselves.

OF3- External

High *External* refers to people who need input from external sources in order to make decisions. Examples of external sources may be other people, managers, a procedure or written instructions. Those high in *External* require others to provide feedback about the quality of their work and they will not want to start or continue a task with direction or feedback.

People high in this pattern are motivated by roles that require adaptability to the needs of the client, such as sales, secretarial jobs, hairdressing, nursing or hostessing roles.

Application of Evaluation Reference to the medical context

Medical practitioners high in *Individual Motives* will evaluate information based on their own criteria and may be dismissive of the opinions of nurses, clients or other medical staff that are not congruent with their own assessment of the situation. These actions may be seen by some as opinionated. Those high in *Individual Motives* are internally motivated and, as they do not depend upon outward validation, they may cope more effectively with difficult times in the role.

Those high in *External* may seek more guidance from peers and senior staff, gather more information from clients and be open to all sources of information. However, they may not trust their own judgement, may take longer to gather data and make decisions. Lack of feedback or ungrateful patients may be de-motivating and could lead to questioning career choice.

iWAM Pattern Category 4: Task Orientation

The fourth OF category consists of two patterns: Alternatives (OF4+) and Procedures (OF4-). The BP4 combination pattern predicts the overall tendency a person has to look for another way of doing things.

OF4+ Alternatives

A person high in *Alternatives* is one who is constantly looking for another or better way of doing things. They may be interested and able to develop new procedures, but not motivated to follow procedures. While they may follow a procedure the first time through, the next time they will begin to alter and improve it or change the rules. Roles that require alternatives thinking include those that focus on creative

thinking, or the devising of new strategies or procedures. This may include high level management roles, consultancy, marketing and design roles.

OF4- Procedures

A person who is high in *Procedures* is not motivated to find alternatives, but feels comfortable and competent when following procedures. They enjoy doing tasks the 'right' way. Those high in this pattern may not recognise if a procedure does not work and may have difficulty conceiving a better way to perform a task.

Additionally, they may feel confused as to what action to take without a procedure. Motivating assignments would include those that provide a clear-cut, proven set of procedures to follow in order to perform the work role. Work role examples may include pilots, nursing, filing clerks and accountants.

Application of Task Attitude to the medical context

A medical practitioner high in *Alternatives* may look for alternative treatments and may be open to alternative methods such as complementary medicine, experimental techniques or creative applications of traditional knowledge. An example of this may be utilising a drug for a specific purpose that has an additional, helpful side effect.

A doctor high in *Procedures* may be mistrusting of unproven techniques, prefers to work methodically, do things by the book and tends to be closed to other alternatives.

iWAM Pattern Category 5: Task Scope

The fifth OF category consists of two patterns: Breadth (OF5+) and Depth (OF5-). The BP5 combination pattern predicts the overall tendency a person has to grasp the overview of a situation.

OF5+ Breadth

A person who is high in *Breadth* (OF5+) is someone who thinks about large pieces of information, working with the overview and the big picture. While a person who scores high in this pattern may work with details on occasion, they prefer to work with the high-level view. A person high in *Breadth* may have difficulty in staying on track sequentially in conversations, focusing randomly on information. This may be evident in presentations or reports, which may display a random quality as the information moves from overview to details and to overview again. This pattern may be found in strategists, CEOs and consultants.

OF5- Depth

Those receiving high scores in *Depth* (OF5-) are motivated to work with details and require information to be presented in a sequential manner. People high in this pattern may have great difficulty conceptualising the big picture or overview of a situation and may have difficulty delegating because it is easier to do the task themselves. Roles that may be motivating to those high in *Depth* are administration, accounting, nursing and hospitality.

Application of Task Scope to the medical context

A medical practitioner high in *Breadth* may be a strategic (overview) person, motivated to be engaged in conceptual, planning work, such as a medical director or researcher. *Breadth* thinking may assist practitioners to see the bigger picture of a client's treatment in the context of their life as a whole and provide a framework of thinking to facilitate the process of diagnosis.

A doctor high in *Depth* will be motivated to be involved in detailed work, explore all the relevant details and information pertinent to presenting problems. Medical students and doctors are required to process considerable amounts of data in minute detail.

iWAM Pattern Category 6: Communication Style

The sixth OF category consists of two patterns: Affective Communication (OF6+) and Neutral Communication (OF6-). The BP6 combination pattern predicts the overall tendency of a person to communicate with and focus on non-verbal communication.

OF6+ Affective Communication

A person who is high in *Affective* will respond to people and their communication with a variety of non-verbal signals. This provides the other person with information about how the communication is progressing. Nodding or tilting the head, smiles of recognition and lifting eyebrows are all signals that indicate how the communication is being received. The person high in this pattern is focused on the other person in a conversation and does not maintain a focus on their own internal states (except as related to that communication). These people are motivated by roles that focus on establishing rapport and communicating with others.

OF6- Neutral Communication

A person with high scores in *Neutral Communication* does not provide facial expressions or body language signals that indicate how the communication is progressing. They usually remain in the same posture and maintain the same facial expression throughout a conversation. People high in this pattern tend to maintain a focus on their own internal states and/or on the content of the information during communication. They do not account for the non-verbal aspects as an important part of the communication process. Roles that will be motivating to people high in *Neutral Communication* will be jobs with little or no need for establishing rapport, such as scientific, accounting or research roles.

Application of Communication Styles to the medical context

A medical practitioner who is high in *Affective Communication* is likely to be overtly communicative and expressive with clients and colleagues, quickly building rapport. They may be highly attuned to the non-verbal signals of their clients which may aid in diagnosis.

A high *Neutral* medical practitioner may concentrate on the actual words and content of client conversations, rather than using a range of other senses (for example, intuition, visual cues, body language) in the diagnostic process. Client engagement and dealing with clients' emotions is likely to be personally challenging to the practitioner.

iWAM Pattern Category 7: Work Environment Type

This seventh OF category consists of two patterns: Group Environment (OF7+) and Individual Environment (OF7-). The BP7 combination pattern predicts the overall preference a person has to work with people or to work alone.

OF7+ Group Environment

People high in *Group Environment* are motivated to be around people constantly and cannot function adequately in situations where people are not with them. Roles that would be motivating to those high in this pattern would include working as a flight attendant, teacher, social worker, hospitality worker, manager, coach or salesperson.

OF7- Individual Environment

Those high in *Individual Environment* are independent and do not need other people. They are motivated by situations where there is little contact or no interaction

with others. Examples of roles that are based on this pattern include writing, inventing, accounting and working as a night guard.

Application of Work Environment type to the medical context

Medical practitioners high in *Group Environment* would be likely to enjoy and function well in small group learning situations and being part of a medical or multi-disciplinary team. These practitioners would be motivated to work with people as part of their everyday work. In contrast, practitioners preferring *Individual Environment* may feel overwhelmed and dissatisfied working constantly around people and seek positions such as medical research, or an administrative role.

iWAM Pattern Category 8: Work Assignment Type

The eighth OF category consists of two patterns: Sole Responsibility (OF8+) and Shared Responsibility (OF8-). The BP8 combination pattern predicts the preference of a person to be fully responsibility for their work.

OF8+ Sole Responsibility

People high in *Sole Responsibility* want to have complete responsibility for the work they perform and want to be acknowledged for their results. If they are part of a team, they are motivated to have responsibility for their part of the project, preferring not to share responsibility with others. Motivating roles may include management and sales.

OF8- Shared Responsibility

People high in *Shared Responsibility* are motivated to share responsibility with the team. They want to be part of the team and prefer the responsibility to belong to the team as a whole. Therefore work roles that would be motivating to people high in this pattern would be project, sales or marketing work based on a team effort.

Application of Work Assignment type to the medical context

Sole responsibility or being fully accountable and responsible for one's actions could be seen to underlie all medical actions, and as such may be present in the majority of doctors. This pattern is reinforced during medical education programs where students are taught that as doctors they are fully responsible for their actions. Even when participating in multi-disciplinary teams medical practitioners will retain full responsibility for their element of contribution.

Shared responsibility may be evident in a medical research team. In medical education, problem-based learning involving small group work requires working together as a team to achieve an outcome. This situation will demonstrate a students' motivation for *Shared Responsibility*.

iWAM Pattern Category 9: Relationship Sorting

The ninth category consists of three patterns which describe a person's appetite for change: Sameness (So1), Evolution (So2) and Difference (So3).

So1- Sameness

People high in *Sameness* have difficulty accepting change. They may ask for change, but their time frame for this can be 10 to 25 years. They desire stability, and their security may be associated with experiencing very little change.

Roles that may be motivating are those that remain relatively the same over time, including book-keeping or teaching algebra

So2- Evolution

Those high in *Evolution* are interested in gradual change for the better, or evolution. These people adapt to change, but if changes do not happen within their appropriate time frame (5 to 7 years), they will force the situation to change. They prefer their world to evolve slowly over time but will accept change as long as it is not dramatic or too often. They are best suited for positions where steady change is the focus such as management roles.

So3- Difference

People high in *Difference* are motivated by difference. These people want, need and create change whenever possible. If change does not happen within the appropriate time frame, (six months to one year) they will force change upon a situation.

These people are motivated by roles where there is significant change, for example, short- term project work or consultancy work. They perform well in high technology development, consumer electronics and fast-moving jobs such as advertising and marketing.

Application of Relationship Sorting to the medical context

This category of patterns demonstrates medical practitioners' desire and ability for dealing with change. Those high in *Sameness* may be stressed by rapid or frequent change and may choose more predictable work environments, such as general practice.

The *Evolution* pattern may underlie the motivation of many medical practitioners, who wish to contribute to patients' health improvements and their own practice by acquiring better equipment, more highly trained staff and more effective procedures. The emphasis on improvement typically would be gradual and ongoing.

Those motivated by *Difference* may be attracted to high change environments such as emergency medicine or surgery. They would likely source new innovations and trial treatments. These practitioners find innovation and change stimulating and if involved in a slower-changing environment, would lose motivation and/or would force change upon the situation.

iWAM Pattern Category 10: Work Approach

The tenth category consists of three patterns: Use, Concept and Structure, which describe the internal process a person uses when approaching or working on a task or project. It measures a person's preference for either theory, structure or implementation in approaching a task.

WA1- Use

A person high in *Use* is an activist who is motivated by physical activity and needs to get into action immediately with a task. They need little theory or structure in order to take action and tend to learn through the performance of the activity. People high in *Use* prefer situations that require activity and include salespeople, entrepreneurs and first-line managers.

WA2- Concept

People high in *Concept* are motivated to understand the theory and analyse a task before they are able to take action. They are well suited to academic or consultancy work.

WA3- Structure

Those high in *Structure* must organise and structure all the resources or parts of a project before they can take action. These people excel in design tasks and in planning. They are motivated to be accountants, higher level managers and architects.

Application of Work Approach to the medical context

Medical practitioners high in *Use* may be attracted to situations where they are competent and understand the procedures and are then able to act quickly and spontaneously, as in emergency medicine. These practitioners prefer not to talk or theorise but rather act, and will understand what to do next, based on their actions and ongoing assessment of the situation. They will enjoy being busy and could appear frenetic at times.

Concept will be evident in medical practitioners who will thoroughly research a situation before taking action. They may be attracted to the field of medical research or Psychiatry. These practitioners would be unlikely to accept a new procedure, technology or drug until they thoroughly researched it.

Structure would be evident in practitioners who find it difficult to proceed until resources are fully organised and structured. Typically this area would be provided by nurses with the practitioner focused on performing the activity (or medical procedure).

iWAM- Pattern Category 11: Temporal Processing

The eleventh category consists of three patterns: Past (TP1), Present (TP2) and Future (TP3). These patterns indicate how persons are oriented when thinking about time.

TP1 Past

A person high in *Past* gathers information from the past as a way of understanding how to perform a task. Those that focus on the past are often critically analytical. They are motivated to work as historians, librarians or archivists.

TP2 Present

Those high in *Present* gather information from what is happening now, in order to understand how to perform a task. These people are often pragmatic and are focused on the present, valuing current data over data from the past. Consequently, they are

motivated by roles which relate to current data, such as being a news reporter, athlete, or short cycle salesperson.

TP3 Future

People high in *Future* gather information from the future in order to understand how to perform a present task and are often dreamers. Therefore, they will excel in jobs which relate to the future issues such as designing, forecasting and being a visionary.

Application of Temporal Processing to the medical context

Practitioners who are primarily focused on the *Past* are likely to value the medical tradition and what they have learned. They may be traditionalists that are resistant to new techniques.

High *Present* practitioners may be totally focused on what is happening in the moment, such as surgeons and emergency doctors.

High *Future* practitioners may focus on technology and embrace and work for medical breakthroughs. They may also envision a new paradigm in medicine.

iWAM Pattern Category 12: McClelland's Motivational Criteria

The twelfth category consists of three patterns. The patterns measure Power (Mo1), Affiliation (Mo2) and Achievement (Mo3).

Mo1 Power

A person high in *Power* is motivated by situations where they have power, authority, and control over people and things. They are motivated by influential positions such as management, ministry, teaching and journalism or other situations where control is the task.

MO2 Affiliation

A person high in *Affiliation* is motivated by situations where people like them, they can participate in taking care of other people and they can be a part of the group. They want to be in situations where they are in contact with people and are able to socialise with them. They are also more likely to be motivated to maintain interpersonal networks and they will act whenever possible to avoid conflict.

MO3 Achievement

People high in *Achievement* are motivated by situations where they can achieve. They are more likely to persist longer, as long as there is a reasonable chance of success. They are motivated by roles where one gets very concrete performance feedback such as entrepreneurship or sales positions.

Application of McClelland's Motivational Criteria to the medical context

Power could be expected to be evidenced amongst medical practitioners who are trained to take full responsibility, be accountable and to be the leader of the multi-disciplinary team. This leadership pattern is found in those that are motivated to take control, to manage and make a difference through their actions.

The *Affiliation* pattern can be seen in doctors who are keen to be liked and appreciated by their colleagues, nurses and their clients. Those high in this pattern may find it difficult to articulate difficult news or tough decisions as part of their work.

Medical practitioners high in *Achievement* are likely to be highly career minded individuals who are focused on achieving their (usually demanding) goals in their area of practice. They are also motivated when their accomplishments are publicly recognised and validated.

iWAM Pattern Category 13: Norming

The thirteenth category consists of four patterns (N1-4). These patterns focus on the unwritten rules in regard to how people interact and what they expect of each other.

N1 Assertive Rules

People high in *Assertive Rules* know the policies and rules and are willing and able to tell others what they should do. They believe the best rules of conduct are those they are following themselves and see these rules as normal conduct. Those high in this pattern respond well to situations where the people around them have the same level of expectations about the work situation.

N2 Indifference

People high in *Indifference* have rules for their own lives and they do not involve themselves in other peoples' work behaviours. They believe there are no best rules of

conduct and while they have rules for their own lives, they care little about other peoples' behaviours.

N3 Compliance

People high in *Compliance* are willing to follow the rules and policies of the organisation. They will try to be the worker the company needs and tend to follow the rules of conduct the manager demands. These people want to do what is expected and will try to conform to organisational policy.

N4 Tolerance

These people know the rules and policies for themselves but do not feel it is appropriate for them to impose their rules on others. Those high in *Tolerance* believe everyone should be doing things in their own way and they respond well to situations where they are allowed to let others lead their own lives.

Application of Norming to the medical context

The *Assertive* pattern would be evidenced in doctors who assertively tell their colleagues they are not performing the procedures correctly or chide nurses for not following their preferences with dressings or treatment regimens.

The *Indifference* pattern may be seen in doctors who feel free to break the rules according to their own values and what they see as most important at that time.

Medical practitioners that exhibit the *Compliance* pattern, unquestioningly accept medical policies and protocols and comply to the rules and expectations of the institution they are employed by or with whom they are associated.

The *Tolerance* pattern would be evidenced in doctors who are non-judgemental of the behaviours of clients and colleagues, though they may differ to their own.

iWAM Pattern Category 14 and 15: Convincer Patterns

The fourteenth and fifteenth categories consist of eight patterns. The Convincer patterns indicate how a person is convinced. The first four Convincer patterns, known as Input Channels, represent the channels by which individuals gather information (Co1-4). The second four Convincer patterns, known as Interpretation, are related to how the person manages the data in order to be convinced (Co 5-8).

Convincer Patterns 1: Input Channels

CO1 Convinced by Seeing

People high in *Convinced by Seeing* must be able to see something to get convinced. It could be to watch a process or to see a graph. It involves a visual process.

CO2 Convinced by Hearing

Those high in *Convinced by Hearing* must hear how, or hear about something in order to be convinced. It could be a verbal report, a discussion or the sound of the machine.

CO3 Convinced by Reading

People high in being *Convinced by Reading* must read information or instructions to become convinced. This could be written reports or an instruction manual.

CO4 Convinced by Doing

Those high in *Convinced by Doing* must actually perform the task themselves in order to be convinced. This may include working alongside other people in order to be convinced about them.

Convincer patterns 2: Interpretation**CO5 Convinced by a Number of Examples**

People high in being *Convinced by a Number of Examples* must be presented with data a particular number of times for them to be convinced. They will learn new tasks by gathering data a certain number of times.

CO6 Convinced Automatically

Those who are high in the *Convinced Automatically* pattern only need a small amount of information before making a decision, as they quickly project the rest of the information.

CO7 Convinced by Consistency

Those who are high in *Convinced by Consistency* are never quite convinced and therefore find it difficult to close down to making a decision. They need to get information every time to remain somewhat convinced. High Consistent people are motivated by roles such as retail management, sales and telemarketing.

CO8 Convinced over a Period of Time

Those high in being *Convinced over a Period of Time* need to have the data remain consistent for a period of time for them to be convinced.

Application of Convincer Strategies to the medical context

Convincer Strategies 1: Input Channels

Medical practitioners high in *Convinced by Seeing* would need to actually view something in order to be convinced. Those high in this pattern would place a high emphasis in diagnosis upon the clinical picture, derived from their own observations.

Those high in *Convinced by Hearing* would need to hear something to be convinced. This might include a client's account of their symptoms or the sound of an emerging symptom, such as rales or heart sounds. They may be convinced to accept a new technology or drug by listening to the testimony of a colleague or salesperson.

The *Convinced by Reading* pattern would be evidenced in doctors who primarily decide or reach a diagnosis based on a client's test results or written reports.

Those high in *Convinced by Doing* would be practical, hands-on practitioners who are convinced as they actually engage in and experience a situation.

Convincer Strategies 2: Interpretation

Practitioners exhibiting the *Convinced by a Number of Examples* pattern would need to check information or data two or three times before being convinced. This may include checking via different input channels such as written reports and tests, clinical pictures and the client's verbal account of symptoms before closing down to a decision.

The *Convinced Automatically* pattern evidences itself in practitioners who make a quick decision without full information. This may arise when a highly experienced doctor immediately recognises a typical cluster of symptoms or may arise through an intuitive sense of what may be occurring. These practitioners see themselves as very decisive. Doctors high in being *Convinced by Consistency* may find it difficult to close down to a decision, as they are never really convinced. This pattern infers that the information will be checked many times, perhaps obsessively, during the decision-making process.

The *Convinced over a Period of Time* pattern is evidenced in doctors who need to think a decision through over a period of time, whether that be hours, days or weeks. It infers that the practitioner will not rush into a decision without due consideration.

iWAM Pattern Category 16: Interest Filters

The sixteenth category consists of eight patterns. These patterns indicate what the person needs to work with or manipulate to feel successful at work.

IF1 Interest Filter for People

A person high in *Interest Filter for People* works best with people and their feelings. They will want to know who they are working with.

IF2 Interest Filter for Tools

A person high in *Interest Filter for Tools* works best with tangible tools and instruments. They will want to make sure that the equipment they are using is in good order.

IF3 Interest Filter for Systems

A person high in *Interest Filter for Systems* works best with the process of things. How it works here, would be an important question for them in the workplace.

IF4 Interest Filter for Information

A person high in *Interest Filter for Information* works best with facts and knowledge. They are highly motivated to seek and gain more information.

IF5 Interest Filter for Money

A person high in *Interest Filter for Money* is concerned about money and keeping score. They will be motivated to focus on budgets and whether people are being paid fairly.

IF6 Interest Filter for Place

A person high in *Interest Filter for Place* is concerned about the geographic or social/political position.

IF7 Interest Filter for Time

A person high in *Interest Filter for Time* is concerned about allotting time and keeping schedules. Deadlines and timing would be the focus of their attention.

IF8 Interest Filter for Activity

A person high in *Interest Filter for Activity* focuses on being busy and active. What do I have to do and what needs to be done would be questions the person would be asking at work.

Application of Interest Filters to the medical context

Practitioners high in *Focus on People* would enjoy working with people and their feelings and might be found in general practice, psychiatry or consulting.

A high *Focus on Tools and Instruments* may lead a doctor into surgery while a high *Focus on Systems* may be evidenced in practitioners who are motivated to set up complex systems in their practice arena.

Practitioners high in *Focus on Information* would be motivated to delve into facts and information and enjoy the pursuit of knowledge.

The *Focus on Money* pattern would be evidenced in doctors who were interested in being involved in the budgetary and financial planning aspects of their practice and who were motivated to be paid well for their services.

A practitioner high in the *Focus on Place* pattern may be cognisant and motivated by status and their social position, while doctors with a high *Focus on Time* would monitor the length of their client consultations, carefully planning and keeping to their schedules.

Practitioners high in the *Focus on Activity* pattern would be always active and moving, gaining satisfaction from their busyness. Inherent in this pattern is the concern that the continual movement may be for its own sake, rather than working towards clear outcomes.

Construction of the iWAM instrument

Scoring of Items

The instrument consists of 40 questions, which require the ranking of five items in each question. The value of this approach is that respondents order five statements for each question instead of responding to each statement independently. According to the developer of the tool, the 40 questions that comprise the iWAM instrument are equivalent to 200 test items in a conventional questionnaire (Merlevede, 2005). As a result, iWAM collects far more information than is generally obtained from an instrument containing only 40 items utilising a Likert scale, for example. The iWAM questionnaire can be administered over the internet or as a hard copy.

Each Work Motivation pattern is measured at least four times throughout the 40

item questionnaire. Participants are scored with five points for their highest ranked item, four points for their second choice, three points for their third choice, two points for their fourth choice and one point for their fifth choice. The scores for each of the 48 Work Motivations tested are then individually tallied to produce the raw score for each pattern. More detailed description of the iWAM instrument scoring system remains the proprietary knowledge of jobEQ Belgium.

Independence of measures

All 48 Work Motivations within the iWAM instrument are designed to be independent measures, even two apparently opposite measures within the same pattern category. For example, the first pattern category (OF1) measures Initiation (OF1+), which is the motivation to take action with no, or minimal, analysis of a situation. The second pattern in this category is Reflecting and Patience (OF1-), where careful analysis and caution is preferred before taking action in a given situation. Rather than be represented as a bipolar measure, where an individual would receive a score for the two measures at a point along a continuum, the two Work Motivations are both measured as independent patterns. Hence, an individual may be low on both Initiation and Reflecting and Patience, or high in both patterns. Conversely, an individual may also be high in one of the patterns and low in the other. According to Merlevede (2005), measuring both patterns separately rather than as a bipolar measure has significant benefits for improving the usefulness of the tool. This involves differentiating individuals who find that both patterns in a category are either important or unimportant, rather finding the average score for both patterns.

Reliability and validity studies on the iWAM instrument

The goal of a test re-test study is to gauge whether a psychological test produces similar results each time it is used. According to Loeviger's theory (1957) many factors influence whether a person completes a test in the same way on re-test. These factors include the motivation of the person, issues of memory such as recalling how the test was initially completed and whether the test conditions were exactly the same.

The iWAM instrument is not a personality measure, where measures remain relatively stable over time (Block, 1995; McCrae & Costa, 1989). This instrument is designed to capture and map the test-taker's Work Motivations at the time of completing the questionnaire, with the presupposition that people change over time, between contexts and after significant interventions or life experiences. The instrument is designed to detect these subtle changes and is therefore used frequently in pre and

post intervention measurements. Additionally, the iWAM is designed as a context specific instrument, where the measures are analysed within the work context and the results are relevant to that context only.

While test re-test studies are traditionally used to assess the reliability of an instrument, the developers of the iWAM instrument state that this approach is not an appropriate process to gauge the instrument's reliability. Merlevede (2007) argues that unless re-test conditions are strictly controlled the sensitive iWAM instrument may detect differences of perception and context and register shifts in Work Motivation scores attained in the initial test. Merlevede (2007) also points out that an instrument of this design type is less likely to achieve the strength of correlations expected from a personality test, where measures may be expected to remain more stable over time.

According to Merlevede, (2007) there was an awareness during the development of the instrument in 2000 that validating the iWAM questionnaire may be challenging. Due to the design of the questionnaire, many of the traditionally applied statistical tests would be difficult to apply. For example, typical validation procedures have been developed for instruments which use a Likert scale and are not as appropriate for instruments where the test-taker is forced to rank a number of statements. The structure of the iWAM is such that many items within the same question will impact on the scores of the item being evaluated. For example, as an item is moved higher or lower during the ranking process, it will influence the scores for those two variables, thereby creating increased statistical complexity. It will also reveal that no simple linear relationship exists between the variable scores and the individual item scores, which would result in poor correlations in a test re- test study.

Merlevede (2007) argues that similar reasoning also exists with a split-half analysis, Cronbach's Alpha or the Kuder-Richardson formulas.

Rather than run the traditional test re-test studies, the reliability of the iWAM instrument was tested in 2000 (Merlevede, 2007) by administering the iWAM instrument and using interviews as the re-test method, with the same population. A benefit of this process was that the interviewers were able to ensure that the test-taker was holding the same context in mind during both the initial test and the re-test procedure. The interviewers (who were blind to participants' iWAM results) used the Language and Behaviour Profile (the oral version for eliciting similar metaprogram measures). The study (n=70) conducted in France in 2000, revealed a correlation of $r=0.90$ between the iWAM patterns elicited and the LAB profile metaprogram equivalents detected in the re-test procedure.

Test re-test studies

As the use of the iWAM instrument extended to 21 countries (between 2000–2008), to scholarly institutions and high profile global companies, there was a growing demand for test re-test studies to be carried out. Therefore, a test re-test study was conducted with students (n=64) from the School for Professional Studies at Saint Louis University, USA between February and April, 2007. The time between the tests was approximately five weeks (38.85 days, SD = 16.77 days).

Thirty-two students were excluded for either not completing the iWAM questionnaire twice, or for not completing the iWAM questionnaire in a reliable manner (the results of an iWAM questionnaire are deemed unreliable if five or more of the 40 iWAM questions have not been answered). In total, only 50% (n=32) of the participants completed the study in a reliable manner. The results demonstrated that 29% of the metaprogram patterns failed to reach a correlation of $>r=0.70$, seen as a statistically acceptable standard. However, when comparing the test re-test scores for the Work Motivation patterns for the entire group, the average absolute scores between test and re-test moved only 2% (Merlevede, 2007). Further analyses using T testing, revealed that there were no statistically significant differences between the means ($p < 0.05$) for any of the 48 iWAM patterns between the test and re-test process. Also, ANOVA revealed that the variance demonstrated significant differences for only three of the 48 patterns.

While Merlevede (2007) argues the iWAM patterns are generally robust and the results are consistent with previous studies associated with the iWAM standard groups, where findings concluded that the standard error for the patterns was less than 5%, in general, the results of the test re-test study were not strong.

Validation study

Further studies into the validity of the iWAM instrument were carried out in Belgium during 2005. Here, a random sampling of the feedback of 617 individuals who had completed the iWAM instrument was conducted by the developer, Patrick Merlevede, with respondents from 14 countries. Respondents were asked to rate their agreement with the iWAM test results for each of the 48 individual iWAM Work Motivation patterns, choosing Yes=Agree, No=Do not agree or Unsure. The survey revealed an average rating of 89.3% agreement for users commenting on their perceived accuracy of their iWAM report. Another question in this survey asked respondents to indicate the number of iWAM patterns with which they disagreed. The data indicated that on average test-takers agreed with up to 90% of the patterns. These results demonstrated high end user validation of the accuracy of the iWAM reports.

However, in interpreting the accuracy of these results it could be argued that test-takers can be uncritically accepting of reports produced by advanced technology or, alternatively, lack the personal insight to accurately validate the results with what they perceive as their own ways of thinking.

Reliability: falsification of answers

The iWAM instrument was built to prevent test falsification. The possibility of preferentially choosing socially acceptable answers has been reduced by using a ranking system to answer questionnaire items and examining the consistency of all answers. Appendix C demonstrates the Information Analysis report. This displays the consistency (or otherwise) of the ranking chosen by a sample test-taker for the four (or five) iterations in which each Work Motivation is measured. Additionally, the iWAM system notifies users if any of the 40 questions have not been ranked in a questionnaire to inform assessors how reliably the questionnaire may have been answered.

Standard working populations

The iWAM instrument includes a standard working population for 10 countries, to use as the basis for relative scores in reporting. The Australian standard group is in beta form and is currently being updated to include the results from 2,500 people. All analyses of the iWAM Work Motivations in this study were performed with raw scores generated by the iWAM software.

Sample iWAM Reports

Sample iWAM reports are displayed as Appendices B, D and E. Appendix B, the HR Summary Sheet, is a one page version of the iWAM report, where the patterns are arranged in their pattern categories. The P and M column titles equate to P for the plus patterns in the category (e.g OF1+, OF3+) and the M represents the minus patterns in the category (e.g OF2-, OF4-).

Appendix D, known as the Personal Graph, traces the relative scores for an individual against the Standard group of Australia (shown as the grey shaded area). Appendix E, the iWAM Attitude Sorter Wheel, is a one-page graph which lists an individual's Work Motivations from those patterns which received the highest scores to those receiving the lowest scores. This demonstrates a hierarchy of the individual's Work Motivations. Additionally an available scoring option provided by the iWAM software is the calculation of BP scores, which provide the total score attained by the individual in a pattern category.

Summary

In Chapter 1, the impact of work motivations upon individual's work performance, satisfaction, engagement, commitment and retention was discussed and applied to the medical context, where this area has traditionally been poorly recognised and researched. Work motivations were presented as a potentially rich area of research for predicting aspects of the medical student experience and performance outcomes.

In Chapter 2 an instrument to measure the work motivations of medical students was explored and described. Overall, the iWAM presents as a valid and reliable instrument. As noted above, the iWAM is not a personality measure, but a specific work context based instrument that measures 48 independent work motivation patterns.

The reliability of the instrument was initially established in 2000 using an interview method as the re test phase of the research, the results revealing a correlation of 0.90. Further conventional test re test studies found all 48 measures to be within acceptable limits. Further, 6,000 iWAM test takers from 14 countries rated the overall validity of the instrument at 0.89. Unlike instruments which utilise a small number of broad measures, the iWAM instrument with its wide range of specific work motivations was seen as appropriate for this study design, which aimed to identify fine distinctions in motivation which may be evidenced in different performance outcomes.

The following research questions are now posed.

Research questions

Study 1: Suitability of the iWAM instrument for applicants to the Bachelor of Medicine program

Question 1:

Is the iWAM instrument (inventory of Work Motivations and Attitudes) a valid and appropriate tool for applicants to the Bachelor of Medicine Program, some of whom may never have worked?

- (a) Are there any statistically significant differences between the mean iWAM Work Motivation scores of the group that have had work experience and the group that have not had work experience?

- (b) What reasons do the group who has had no work experience provide as their reference in answering the questions in the iWAM questionnaire.

Study 2: iWAM and medical student outcomes

Study 1 was designed as the foundation for the research, so that if the iWAM proved to be a valid instrument for school leavers applying for places in the Bachelor of Medicine program, the following research questions would then be explored with a sample of medical students:

Question 1:

What are the critical Work Motivations (as measured by the iWAM instrument) that predict:

- (a) satisfaction with the choice of medicine as a career
- (b) academic achievement
- (c) clinical performance

in medical students from Years 1 to 5 in the Bachelor of Medicine program at the University of Newcastle, NSW?

Question 2:

To what extent do the identified critical Work Motivations for each of the three outcome areas of:

- (a) satisfaction with the choice of medicine as a career
- (b) academic achievement
- (c) clinical performance change in response to the five year medical training program?

Question 3:

Do the critical Work Motivations for the three outcome variables remain critical when seven demographic variables for medical students in the Bachelor of Medicine program are introduced as co-variants.

3

Trialling the iWAM instrument with applicants to the Bachelor of Medicine program

While the identification of potentially critical Work Motivations that might predict good and poor outcomes in academic, clinical and career choice satisfaction was the focus of the study, the trialling of an instrument to reliably measure these Work Motivations in future medical students was a prerequisite to this aim. However, researching the utility and reliability of the iWAM instrument as a potential screening tool for applicants to medical programs raised a significant issue. It was assumed that a percentage of applicants to the medical program may never have been engaged in a work situation and as the iWAM instrument positions all items within a work context, the ability of these applicants to interpret and reliably complete the survey was under question. While it could be postulated that organising oneself in a school academic program, in voluntary work or sports activities may all similarly demonstrate the unconscious preferences or thinking styles of the individual, this hypothesis has not been tested through rigorous research.

This research issue was addressed by trialling the validity of the iWAM instrument with a random sample of individuals who had applied for entrance into the Bachelor of Medicine program at the University of Newcastle, NSW. The research design included both quantitative and qualitative testing of the applicants, to acquire rich data on applicants' responses to using the iWAM instrument.

Participants

The Applicant sample was selected randomly from a pool of approximately 2,500 applicants from within Australia to the 2006 and the 2007 Bachelor of Medicine programs at the University of Newcastle, NSW. The individuals were identified by an administrative officer in the School of Medicine who computer generated 500 names from each year's applicant group. A sample size of 120 participants was estimated to ensure sufficient power to the study and to demonstrate reliability of the instrument.

Instruments

(i) The iWAM instrument, as described in the previous chapter, was included in the test battery.

(ii) Feedback questionnaire

A Feedback questionnaire was devised by the researcher to gauge participants' understanding of the iWAM items and the ease with which they completed the iWAM questionnaire. The Feedback questionnaire also acted as the means to identify those who had previously engaged in work and those who had not worked within the applicant sample which provided the basis for statistical analysis of the responses of the two groups.

The Feedback questionnaire (Figure 3.1) requested that participants respond to 4 items in either the Worked or Not Worked section using a 4 point Likert scale ranging from Strongly Agree to Strongly Disagree. The questions posed to applicants on the Feedback questionnaire were:

Question 1: On the whole I understood the iWAM questions

Both Worked and Not Worked groups were asked to report on this question in order to allow a later analysis of any difference between the self-reported understanding of the two groups

Question 2 (Worked group): Having direct working experience helped me to effectively answer the questions.

Question 2 (Not Worked group): I felt I could not effectively answer the (iWAM) questions because I have no direct working experience.

These questions were framed to gauge whether there was any difference between the two groups in their perception of their ability to effectively answer the iWAM items. As these items are framed within the work context, the perception of the ability of the applicants who had not worked to effectively answer the iWAM items provided critical information for this study.

Question 3: On the whole I was able to easily complete the iWAM questionnaire:

This question posed to both groups, aimed to elicit the applicants' subjective ratings of their ease in completing the iWAM questionnaire and to identify any differences between the two groups.

Figure 3.1 The Feedback Questionnaire

Confidential iWAM Feedback Questionnaire

(iWAM) ID number: - - - - -

Please complete the Questions in this Box OR Please complete the Questions in this Box

IF YOU HAVE NEVER WORKED (paid/unpaid employment)

	SD	D	A	SA	
1	2	3	4	4	Please circle the number that is closest to your response for the following questions
	Strongly Disagree	Disagree	Agree	Strongly Agree	
1. On the whole, I understood the iWAM questions					
	1	2	3	4	SD D A SA
2. I felt I could not effectively answer the questions because I have had no direct working experience					
	1	2	3	4	
3. On the whole, I was able to easily complete the Questionnaire					
	1	2	3	4	

IF YOU HAVE WORKED (paid/unpaid employment)

	SD	D	A	SA	
1	2	3	4	4	Please circle the number that is closest to your response for the following questions
	Strongly Disagree	Disagree	Agree	Strongly Agree	
1. On the whole, I understood the iWAM questions					
	1	2	3	4	SD D A SA
2. Having direct working experience helped me to effectively answer the questions					
	1	2	3	4	
3. On the whole, I was able to easily complete the Questionnaire					
	1	2	3	4	

Question 4: I answered the questions by referring to:

The final question allowed both Worked and Not Worked groups to provide a personalised description of the context they referred to when answering the iWAM items. This question was seen as vital to gaining understanding of how persons without working experience may conceptualise the iWAM items and whether their responses would be significantly different to the group who had worked.

Procedure

The 500 bundles were posted in January 2006 and 58 consent forms were returned over the following four weeks. However, only 33 (of 500 invited) participants completed the research protocol. Therefore, it was considered necessary to re-run the research for the following intake, in October 2006. In response to the second round of research another 58 participants were added to the Applicant Sample. In total, 1,000 applicants received invitation letters, with a return rate of approximately 9%, 91 applicants completing the study requirements overall.

The Applicant sample was asked to:

1. Return signed consent forms
2. Complete the online iWAM questionnaire, which required twenty to thirty minutes. Alternatively, participants could elect to complete and return a hard copy of the iWAM questionnaire
3. Complete the online or hard copy of the Feedback questionnaire

After receiving the signed consent forms, the applicants participating in the study were given instructions on how to complete the questionnaires and generate a personal iWAM report. Alternatively, participants were mailed the hard copies of the iWAM and Feedback questionnaires. Approximately one quarter of the applicants elected to complete and return hard copy versions of the questionnaires. In this case, the researcher generated and mailed participants' iWAM reports.

A copy of the applicant sample consent form, the applicant invitation letter and email instruction letter are included as Appendices F, G and H.

Data analysis

Initially the sample was divided into the two functional groups of Worked and Not Worked from self-report information supplied in the Feedback questionnaire. The quantitative analysis of the iWAM results included T testing the mean scores for the 48 iWAM Work Motivations for the Worked and Not Worked groups, to detect if there were

any statistically significant differences between the two groups. The assumption underlying this approach was that if the Not Worked group were unable to effectively complete the iWAM items due to their lack of direct working experience, there may be significant differences between the iWAM results of these two groups, given the participants formed a normally distributed sample.

The responses of the Worked and Not Worked groups to Feedback Questions 1 to 3 were also T Tested to detect any significant differences between the two groups in their self-reported ability to effectively understand and complete the iWAM items. Finally, the responses of the Not Worked group to Question 4, which elicited descriptions of the contexts used to answer the iWAM items, were analysed for common themes.

Results

Descriptive statistics of the applicant sample

The sample comprised 91 applicants to the Bachelor of Medicine program who applied over the two-year period 2006 - 2007. While all 91 individuals completed the iWAM questionnaire only 61 completed the Feedback questionnaire (67%). The number of applicants answering the demographic questions was low.

Table 3.1 Applicant sample and gender

Gender	N	%
Male	4	4.4
Female	24	26.4
Unspecified	63	69.2
Total	91	100.0

There was an apparent over-representation of female participants in the sample, who comprised 85.7% of the respondents to this question. However, overall, 69.2% of participants did not reply to the question of gender. The mean age of the sample was 22.2 years (SD 6.2 years) and the range of ages was from 16 to 49 years.

Table 3.2 Applicant sample: country of origin

Country	N	%
Australia	82	90.11
Japan	1	0.91
Malaysia	1	0.91
Singapore	1	0.91
Unspecified	6	7.16
Total	91	100.0

The applicant sample was almost exclusively from Australia, with one participant from Japan, one from Singapore and one from Malaysia.

Difference in applicant group due to work status

Applicants were asked to respond to the question of whether they had worked or not worked via the Feedback questionnaire.

Table 3.3 Applicant sample: Worked / Not Worked

Work Category	N	%
Worked	51	56.0
Not Worked	10	11.0
Unspecified	30	33.0
Total	91	100.00

As Table 3.3 demonstrates, almost a third of the participants did not reply to this question. Of those who replied, 56% reported that they had been involved in voluntary or paid employment.

Table 3.4 T Tests of iWAM Work Motivations between Worked versus Not Worked applicant sample groups

Work motivation Code	Description	p
OF1+	Initiation	0.65
OF1-	Reflection	0.65
BP1	Action level	0.85
OF2+	Goal Orientation	0.28
OF2-	Problem Solving	0.95
BP2	Action Direction	0.86
OF3+	Individual Motives	0.82
OF3-	External frame	0.43
BP3	Evaluation Reference	0.38
OF4+	Alternatives	0.46
OF4-	Procedures	0.09
BP4	Task Attitude	0.28
OF5+	Breadth	0.28
OF5-	Details	0.50
BP5	Task Scope	0.19
OF6+	Affective Communication	0.85
OF6-	Neutral Communication	0.84
BP6	Communication Style	0.76
OF7+	Group Environment	0.32
OF7-	Individual Environment	0.36
BP7	Work Environment Type	0.59
OF8+	Sole Responsibility	0.58
OF8-	Shared Responsibility	0.99
BP8	Work Assignment Type	0.91
So1	Sameness	0.89
So2	Evolution	0.10
So3	Difference	0.62
WA1	Use	0.77
WA2	Concept	0.78
WA3	Structure	0.60

Table 3.5 T Tests of iWAM Work Motivations between Worked and Not Worked applicant sample groups (cont.)

Work motivation Code	Description	p
TP1	Past	0.81
TP2	Present	0.48
TP3	Future	0.82
N1	Assertive Rules	0.03*
N2	Indifference	0.03*
N3	Compliance	0.83
N4	Tolerance	0.10
Mo1	Power	0.88
Mo2	Affiliation	0.38
Mo3	Achievement	0.39
Co1	Convinced by Seeing	0.88
Co2	Convinced by Hearing	0.84
Co3	Convinced by Reading	0.28
Co4	Convinced by Doing	0.60
Co5	Convinced by Number Examples	0.73
Co6	Convinced Automatically	0.70
Co7	Convinced by Consistency	0.96
Co8	Convinced Period of Time	0.70
IF1	Focus on People	0.54
IF2	Focus on Tools	0.73
IF3	Focus on Systems	0.73
IF4	Focus on Information	0.41
IF5	Focus on Money	0.008
IF6	Focus on Place	0.94
IF7	Focus on Time	0.35
IF8	Focus on Activity	0.57

Table 3.5 demonstrates that the means of only three of the 48 Work Motivations were statistically significantly different between the two groups. The Unspecified individuals were not included in the calculations. The patterns that revealed a difference were Focus on Money (IF5, $p < 0.008$), Assertive Rules (N1, $p < 0.03$) and Indifference (N2, $p < 0.03$).

The results indicated that the Worked group were more focused on money and more focused on rules of conduct than their peers in the Not Worked group.

Results of the Feedback questionnaire items

Question 1: 'On the whole I understood the iWAM questions':

Table 3.6 T test Worked versus Not Worked groups for Question 1

Work Status	N	Mean score for Question 1	SD	p
Worked	51	3.35	0.56	0.78
Not Worked	10	3.30	0.49	

A T test revealed that there was no statistically significant difference between the Worked and Not Worked groups, demonstrating that those who had worked and not worked were both able to understand the items in the iWAM questionnaire

Question 2: 'I felt I could not effectively answer the (iWAM) questions because I have no direct working experience'

Table 3.7 T test Worked versus Not Worked groups for Question 2

Work Status	N	Mean score for Question 1	SD	P
Worked	10	2.70	1.1	0.78
Not Worked	2	3.00	0.0	

A T test revealed that there was no statistically significant difference between the groups in the influence of working experience to their ability to answer the iWAM items. Only two of the ten participants in the Not Worked group replied to this question. The small sample sizes of both groups indicate a non generalisable result.

Question 3: 'On the whole I was able to easily complete the iWAM questionnaire'

A T Test was not able to be computed for this question because there were no respondents from the Not Worked group.

Question 4: I answered the questions by referring to:

In total, 49 of the participants (47.5%) replied to this question. The responses from both Worked and Not Worked groups were thematically analysed and labelled in seven categories. These categories are displayed in Table 3.8.

Table 3.8 Thematic analysis of applicant explanation for how they answered the iWAM questions: Worked versus Not Worked Groups

Category Description N = 49	Number of responses each Category	%
Voluntary/paid work	24	49
School/Sport	8	16
Self-knowledge	13	27
Projection into future	8	16
Life experience	5	10
Feedback: school/employers	2	4
Other	2	4
Total responses	62	100

The specific contexts cited by participants in the not worked group as the basis for their answers to the items in the iWAM questionnaire are listed in Table 3.9.

Table 3.9 Applicant Not Worked group: the basis on which the iWAM questions were answered

Category Description	Number of responses in each category	%
Self-knowledge	1	7.25
School/ Sports	4	28.5
Life experience	1	7.25
Projection into future	4	28.5
Feedback from others	0	0.0
Other	4	28.5
Total	14	100.0

The responses from this participant group indicated that those who had not worked either remembered a group situation or projected themselves into a possible future group or work situation. Over a quarter of the respondents to this question formulated individual and disparate responses that did not fit a thematic category but allowed them to feel they were able to answer the iWAM questions.

Summary of results

The study tested 91 Applicants to the Bachelor of Medicine program to assess whether the work contextualised iWAM instrument would be a reliable and appropriate tool to use with medical students, some of whom may never have worked.

When the mean work motivation scores of the two groups of Applicants (worked and those who had not worked) were T Tested for differences between the 2 groups, only 3 of the 48 iWAM Work Motivations showed a significant difference. These 3 Work Motivations were Focus on money (IF5) and attitudes to policies and rules (Assertive Rules (N1) and Indifference (N2). Further, the self-report scores in the 4 question iWAM Feedback questionnaire which assessed applicants' understanding of the items

and ability to complete the questionnaire also revealed no significant differences between the worker and not worker applicant groups.

Feedback Questions 1 and 2 assessed participants' understanding of the iWAM questions and the influence of their working experience (or lack of working experience) in answering the iWAM questions. T Tests between the mean scores for Questions 1 and 2 for the worked and not worked groups showed no significant differences. However, Question 3 was not answered sufficiently by the participant from both groups to allow a significant result. As shown below, the poor response to Question 3 may have reflected the apparent similarity to Question 1 with the fine distinctions not immediately obvious to participants, who may have felt that they had already answered the question.

Question 1: 'On the whole I understood the iWAM questions':

Question 3: 'On the whole I was able to easily complete the iWAM questionnaire'

In summary, the results for the 48 Work Motivations did not differ significantly between the two groups and the self-reported understanding of the iWAM questionnaire items also did not reveal a significant difference between groups. Therefore, the results indicate that those who have not worked can complete the iWAM questionnaire just as well as those who have worked. Further, the Feedback questionnaire revealed that those who had not worked referred to a number of sources such as sports, school, voluntary experience and self-knowledge when completing the iWAM items. However, as the response to the Feedback questionnaire was poor, the results suggest a cautiously generalisable result.

Discussion

The validity of the iWAM instrument for Applicants to the Bachelor of Medicine program at the University of Newcastle, NSW was established in this study. While initial testing found that the iWAM instrument is a valid tool to use with school leavers, the reduced sample size for the study could be seen to lower the generalisability of the study findings. Additionally, the low response rate to two of the Feedback questions presents a further limitation to the study. Therefore, an appropriate next step to this research would be to pilot the instrument with feedback from a larger sample of applicants and to re-write the feedback questionnaire, combining Questions 1 and 3 to avoid repetition.

To encourage maximal numbers of participants for the medical student sample, more direct strategies were employed. This included presenting the personal benefits of the research directly to the medical students at the end of combined lectures and answering objections and questions surrounding the research.

The next chapter outlines the study with medical students in which specific Work Motivations predictive of medical student outcomes in the areas of academic and clinical performance and satisfaction with career choice were investigated.

4

Critical Work Motivations of medical students

Introduction

The primary research question for this study was to test the extent to which 48 work attitudes and motivations, as measured by the inventory of Work Attitudes and Motivations (iWAM) instrument, act as reliable predictors of career choice satisfaction with career choice, academic achievement and clinical performance in medical students in the Bachelor of Medicine program at the University of Newcastle, NSW. Hence, the medical student study was designed to identify any Work Motivations that might be associated with or predictive of good or poor performance in these three outcome areas.

Research questions for the medical study

The specific research questions for the study included:

Question 1: What are the critical Work Motivations (as measured by the iWAM instrument) that predict:

- (a) career choice satisfaction with the choice of medicine as a career
- (b) academic achievement
- (c) clinical performance

in medical students from Years 1 to 5 in the Bachelor of Medicine program in medical students at the University of Newcastle, NSW?

Question 2: Do the critical Work Motivations for the three outcome variables remain critical when seven demographic variables for medical students in the Bachelor of Medicine program are introduced as co-variates?

Question 3: To what extent do the identified critical Work Motivations for each of the three outcome areas of

- (a) career choice satisfaction with the choice of medicine as a career
- (b) academic achievement
- (c) clinical performance

modify in response to the five-year medical training program?

Methodology

The methodology for this study differed from previous studies where desirable qualities of medical students were identified by experts, experienced doctors, or consumers of the health system (Powis & Bristow, 1997a) or alternatively, by researchers who hypothesised and tested the significance of a range of personal attributes to medical student outcomes.

This study aimed to add to the body of knowledge in the personal qualities testing of medical students by working backwards, as it were, by modelling excellent and satisfied students and contrasting their Work Motivations with students who were underperforming and dissatisfied. Specifically, the modelling process examined and contrastively analysed the Work Motivations of the medical students who resided at either end of the normal curve in the three outcome variables: academic, clinical and career choice satisfaction scores. This process was designed to identify the critical Work Motivations that were predictive of high performance in each of these outcome areas. While it is acknowledged that the work motivations of medical students in training may not be as well-matured as those of experienced medical practitioners, the emphasis on clinical competency and perceived satisfaction and job fit in this area was seen to be indicative of later real world practice.

The iWAM instrument has been specifically designed to be used with the modelling process described above. This tool is not a personality instrument and each report is specific to the individual. iWAM was chosen for its detailed and more complex treatment of characteristics at a higher level of processing than personality traits. The motivations and attitudes measured by iWAM can be seen as the drivers of human behaviour (Merlevede, 2001). Additionally, unlike other tools which focus on a small number of broad measures (e.g. the NEO Big Five) the iWAM comprises 48 independent patterns, designed to detect fine distinctions in motivations that drive human behaviour.

Additionally, iWAM is a contextual instrument which measures 48 patterns reflective of the individual's perception. Over time, changes in perception, maturity, or different life context may be evidenced in a shift in the individual's motivational (iWAM) patterns. While it might be argued that more stable measures may be more appropriate for personal qualities testing in medical students, this instrument provides the means to test if vital patterns remain stable during training or whether the need to select for

particular qualities is less important, due to a training in effect provided by the medical program.

Research context

The research was conducted at the University of Newcastle, NSW, from January to November, 2006. The university has a well-established and respected Faculty of Medicine, where selecting applicants to the Bachelor of Medicine program based on pre-determined personal qualities as well as academic criteria has been practised since 1977.

Participants

All students in the five-year undergraduate medical program were invited to participate in the study. This unrestricted sample was selected to provide the highest possibility of a large participant group which may exhibit the inherent variability in academic and clinical performance and self-reported career choice satisfaction. Additionally, as one of the research questions investigated the extent to which the training program might change or develop medical students' thinking styles throughout the five years, this necessitated participation from students in all years.

In order to increase participation, participants were offered an individual iWAM feedback report which outlined their six highest and four lowest Work Motivations. This report was provided automatically by the iWAM software on completion of the questionnaire.

Instruments used in the data collection process

- (i) The iWAM questionnaire as described in Chapter 2
- (ii) The satisfaction with the choice of medicine as a career questionnaire

A self-report satisfaction questionnaire was devised by the researcher to gauge participants' subjective ratings of their satisfaction with their choice of medicine as a career. The questionnaire was designed because an appropriately tailored instrument was not available to obtain the specific information that would contribute to research questions under study.

The questionnaire was initially piloted with six university lecturers in the Faculty of Health for errors, congruence, and clarity, and then was used with the medical student sample.

Demographic items

The questionnaire was prefaced with a series of six questions under the title 'demographic information'. The questions aimed to collect data on a range of demographic and environmental areas to add to regression tables to help explain the variance found in medical student performance. These questions are displayed as Table 4.1, as Page 1 of the satisfaction with career choice questionnaire.

Description of the demographic items

The demographic question on age was included in the questions based on findings that maturity may affect ability or motivation to learn (Sadler-Smith, 1996) while the gender question was included based on research by Hojat, Glaser, Xu, Veloski, Christian (2002); Pawelczyk, Pawelczyk, & Bielecki (2007) and Meit, Borges & Early (2007) who demonstrated differences in medical student performance related to gender.

The influence of the amount of time devoted to study and its relationship to student performance has been investigated by Wilkinson, Wells & Bushnell (2004). This demographic was seen as a possible significant contributor to student performance, therefore the average number of study hours per week was also included in the demographic questions. Additionally, whether students were employed was gauged through questions on employment status and working hours outside the program.

Finally, it was postulated that living away from home for the first time might also affect student satisfaction and hence performance. Therefore, this item was also included in the demographic questions.

Description of the satisfaction with the choice of career questionnaire

The questionnaire was designed to gather data on student satisfaction with career choice that would be used in correlation and regression analyses with iWAM Work Motivation scores. These analyses aimed to identify the specific iWAM Work Motivations that were associated with high satisfaction and low satisfaction with the career choice of medicine.

The satisfaction with career choice questionnaire comprised 17 items, which were graded on a 5 point Likert scale ranging from strongly disagree to strongly agree. The content of the questionnaire items focused on medical students' comfort and satisfaction with various elements of the academic and clinical program and the

medical student experience. Extrinsic factors that might influence career satisfaction also informed the item design.

The 17 satisfaction with career choice items were designed under five subscales: comfort with career choice, dissatisfaction with the choice of medicine as a career, perceived fit with academic and clinical areas of the program, overwhelm, and perceived support. The 17 items which comprise the satisfaction with career choice questionnaire are outlined in Table 4.1 and are described below:

Confidential Satisfaction Questionnaire

DEMOGRAPHIC INFORMATION

1. ID Number (6 Digit ID number used in the iWAM Questionnaire).....

2. What year of the B.Med. Program are you currently undertaking?.....

3. Age.....

4. Gender.....

5. Do you work part time?.....

6. If so, how many hours per week do you work?.....

7. On average, how many hours do you devote to study per week (including class time).....

7. Are you living away from home for the first time this year?.....

OFFICE USE ONLY

1 (SD)	2 (D)	3 (A)	4 (SA)
Strongly Disagree	Disagree	Agree	Strongly Agree

INSTRUCTIONS: Please consider to what extent you feel the following statements describe your experience as a medical student.

Classify your response by circling the number that is closest to your level of agreement with each statement

As a medical student I feel that:

	SD	D	A	SA
1. I am more comfortable with the clinical areas of medicine than the academic areas	1	2	3	4
2. The clinical component of the Program is a natural fit with my inherent strengths	1	2	3	4
3. The content of the academic component of the Program is in line with my personal interests	1	2	3	4
4. The academic load is overwhelming	1	2	3	4
5. On clinical placements, I am often overwhelmed by the emotional demands of the role	1	2	3	4
6. If it were possible to choose my career again I would make Medicine my first choice	1	2	3	4
7. I have frequent thoughts of leaving the Program	1	2	3	4
8. The procedural aspects of Clinical Medicine are difficult for me	1	2	3	4
9. I am often overwhelmed by the responsibilities demanded of me as a future Doctor	1	2	3	4
10. The difficulties of being a Doctor outweigh the satisfaction gained	1	2	3	4
11. The role of being a Doctor in training fulfils a deep need in me	1	2	3	4
12. I have a supportive network to help me with the challenges of the Program	1	2	3	4
13. I would cope better with the Medical Program if it were more structured	1	2	3	4
14. My conceptions of the profession of Medicine before beginning the Program were fairly accurate	1	2	3	4
15. The experience of becoming a Doctor has not been as satisfying as I had hoped	1	2	3	4
16. The difficulties of student life are the main cause of any dissatisfaction I experience in becoming a Doctor	1	2	3	4
17. I find the small group work a satisfying way of learning	1	2	3	4

Satisfaction with career choice questionnaire items and subscales

Item 1: I am more comfortable with the clinical areas of medicine than the academic areas.

Subscale: Perceived fit with academic and clinical areas of the program.

Item 1 aimed to identify the Work Motivations associated with a preference for and comfort in the clinical areas of medicine. These Work Motivations might be associated with the practical rather than the theoretical areas of medicine.

Item 2: The clinical component of the program is a natural fit with my inherent strengths.

Subscale: Perceived fit with academic and clinical areas of the program.

Item 2 aimed to assess the Work Motivations of those who perceived a sense of both high natural fit and low fit in the clinical area.

Item 3: The content of the academic component of the program is in line with my personal interests.

Subscale: Perceived fit with academic and clinical areas of the program.

Item 3 assessed the Work Motivations of medical students who were intrinsically interested in the theoretical (as opposed to the practical) component of the program.

Item 4: The academic load is overwhelming.

Subscale: Overwhelm.

Item 4 was designed to isolate specific Work Motivations that might predispose students to feeling overwhelmed with the study requirements of the program.

Item 5: On clinical placements, I am often overwhelmed by the emotional demands of the role.

Subscale: Overwhelm.

Item 5 assessed the Work Motivations that contributed to emotional overwhelm with the doctor's role, rather than the cognitive or organisational aspects of the role.

Item 6: If it were possible to choose my career again I would make medicine my first choice.

Subscale: Comfort with career choice.

Item 6 gauged the intensity of the medical students' career choice satisfaction, thereby allowing the analysis of the Work Motivations of those who would choose medicine again as their first choice and those students who were least satisfied with their career choice.

Item 7: I have frequent thoughts of leaving the program.

Subscale: Dissatisfaction with the choice of medicine as a career.

Item 7 aimed to isolate the Work Motivations of those who were so dissatisfied that they considered taking action to leave the profession. Frequent thoughts of leaving were felt to be associated with poor job fit to the profession.

Item 8: The procedural aspects of clinical medicine are difficult for me.

Subscale: Perceived fit with academic and clinical areas of the program.

Item 8 focused on work procedures, a specific work motivation measured by the iWAM instrument. As performing medical procedures is a vital element of clinical practice, the item was included to assess a possible cluster of Work Motivations that might either support or thwart working with clinical procedures. These motivations could also add further information to the drivers of clinical performance in medical students.

Item 9: I am often overwhelmed by the responsibilities demanded of me as a future doctor.

Subscale: Overwhelm.

Item 9 was designed to assess the Work Motivations of medical students who might associate a perceived sense of overwhelm with becoming a doctor. While this item assessed overwhelm with role responsibilities, Item 4 assessed emotional overwhelm and Item 5 assessed academic overwhelm. The Work Motivations associated with the three aspects of overwhelm were also analysed for similarities and differences.

Item 10: The difficulties of being a doctor outweigh the satisfaction gained.

Subscale: Dissatisfaction with the choice of medicine as a career.

Item 10 aimed at further assessing the Work Motivations of medical students who experienced greater dissatisfaction than satisfaction with the career choice of medicine.

Item 11: The role of being a doctor in training fulfils a deep need in me.

Subscale: Comfort with career choice.

Item 11 aimed to assess Work Motivations of medical students who experienced a sense of vocation or meaning with their career choice seen to be associated with a high level of satisfaction and fit.

Item 12: I have a supportive network to help me with the challenges of the program.

Subscale: Perceived support.

Item 12 aimed to assess whether feeling unsupported might influence students' satisfaction with the medical program. It also aimed to identify the Work Motivations of those that felt unsupported in the medical program.

Item 13: I would cope better with the medical program if it were more structured.

Subscale: Perceived fit with academic and clinical areas of the program.

Item 13 aimed at identifying Work Motivations that were associated with those that were motivated and unmotivated by the program design of the Newcastle program which does not provide a high level of structure for students.

Item 14: My conceptions of the profession of medicine before beginning the program were fairly accurate.

Subscale: Perceived fit with academic and clinical areas of the program.

Item 14 was included to assess if differences in preconceptions and the reality of training as a doctor were influencing medical students' satisfaction with their career choice.

Item 15: The experience of becoming a doctor has not been as satisfying as I had hoped.

Subscale: Dissatisfaction with the choice of medicine as a career. Item 15 was included to identify the Work Motivations that were associated with general satisfaction and dissatisfaction with the career choice of medical students. This

item was also framed to act as a check to Item 7 and Item 10 which also assessed medical students' general level of satisfaction with their career choice.

Item 16: The difficulties of student life are the main cause of any dissatisfaction with the experience in becoming a doctor. 4: Study 2

Subscale: Dissatisfaction with the choice of medicine as a career.

Item 16 was included to assess whether extrinsic factors related to being a student, rather than dissatisfaction with the medical program, were influencing career satisfaction.

Item 17: I find the small group work a satisfying way of learning.

Subscale: Perceived fit with academic and clinical areas of the program.

Item 17 was designed to measure the Work Motivations associated with a preference for working and learning in groups. As this approach is fundamental to the University of Newcastle medical program, identified Work Motivations were thought to provide additional quantitative information to the university's medical selection process.

Procedure

Years 1, 2 and 3 were each addressed for fifteen minutes at the end of a combined lecture and consent forms and invitation letters distributed to interested students. However, as Year 4 and Year 5 students were dispersed around the state in various clinical placements for most of the academic year, a combined meeting with them was not possible in the timeframe allowed for data collection. Therefore, these years were approached by an invitational email through their student email address. The title of the email was 'critical attributes of practising doctors', and the mail briefly outlined the study, offering a complimentary work attitudes and motivations profile for participants. After four weeks a reminder letter was sent. In total, 116 medical students from Years 1 to 5 agreed to participate in the study. Copies of the consent form, invitation letter to Years 1 to 3, email instruction letter to Years 1 to 3 and the email invitation letter to Years 4 and 5 are attached as Appendices I, J and K.

What were the participants asked to do?

Medical student participants from Year 1 to 5 were asked to:

1. Submit the consent form in a collection box in the Medical school. Years 4 and 5 returned completed consent forms by email.

2. Complete the online iWAM questionnaire, which required twenty to thirty minutes. Alternatively, they could complete and return a hard copy of the iWAM questionnaire by post.
3. Complete the online (or hard copy) satisfaction with career choice questionnaire, which required approximately five to ten minutes.

On receipt of the signed consent form, the research team emailed participants an instruction letter with a hyperlink to the iWAM testing site or hard copies of the questionnaires, if requested. Only two participants in this sample elected to complete the hard copy version of the questionnaire. A copy of the iWAM questionnaire is attached as Appendix L.

Medical student grades: academic and clinical performance data

For correlation and regression analyses the academic and clinical performance scores for Semester 1, 2006 for the 116 participants from Years 1 to 5 were obtained. The University of Newcastle assessment system for the Bachelor of Medicine program consists of ungraded pass or fail grades across all five years, with the content areas and methods of assessment also differing between the years. As the data analysis required consistent quantitative data for participants from all years, a system for identifying common elements between the years was required.

Analysis of the assessment criteria across the Bachelor of Medicine program revealed that Multiple Choice Questions (MCQ) and Short Answer Questions (SAQ) were common to all years. This latter provided the quantitative basis for the Academic Achievement dependent variable for the research. There was a wide variety of measures for clinical performance throughout the program, but the Objective Structured Clinical Examinations (OSCE) was chosen to reflect the clinical variable for the research. The OSCE was included in the assessment schedule for all years, except Year 1.

Data analysis: medical student sample

Initially, a multivariate analysis (principal components analysis, factor analysis) of the variables was performed to define the clusters (and associated cut off scores) for the theoretical model groups. These groups were defined as the academic, clinical, satisfaction with career choice and demographic groups. The iWAM questionnaire and the satisfaction with career choice questionnaire were both subjected to factor analysis.

The relationships between the 48 iWAM Work Motivations and the three outcome variables (academic and clinical performance and career choice satisfaction with career choice) were explored initially via correlation matrices. The NLP notion of modelling focuses on the identification of personal variables that characterise high performance in an outcome area. Congruent with this notion, this study has chosen to utilise multiple linear regression analysis to isolate the significant Work Motivations which differentiate the high and low performing medical student participants in the three outcome areas of satisfaction with career choice and academic and clinical performance. Regression analysis is a statistically reliable method which is able to identify significant Work Motivations predictive of performance and the predictive strength of each of these motivations to impact upon medical student performance. Motivations that were found to be predictive of performance in the three outcome areas were named critical Work Motivations.

The final models for each of the outcome areas were produced by using the general linear model adding all the Work Motivations and demographic variables one at a time. Finally, to investigate to what extent the critical Work Motivations for each of the three outcomes areas might change in response to the five-year Bachelor of Medicine program, the means of the critical Work Motivations for each of these three areas were analysed using Analysis of Variance (ANOVA) to determine if there were statistically significant changes between Years 1 to 5 in the program.

Results

This section outlines the findings for the two studies undertaken to test the extent to which 48 work attitudes and motivations, measured by iWAM, could reliably predict career choice satisfaction with the choice of medicine as a career, academic achievement and clinical performance in medical students in the Bachelor of Medicine program at the University of Newcastle, NSW.

Descriptive statistics

The medical student sample consisted of 116 medical students enrolled in all years (1 to 5) of the Bachelor of Medicine program at the University of Newcastle, NSW. This represented approximately 20% of the total student cohort. As indicated in Figure 4.1, while each year of the program was represented in the sample, there was a higher representation from Years 1 and 2, which together comprised 66.2% of the sample.

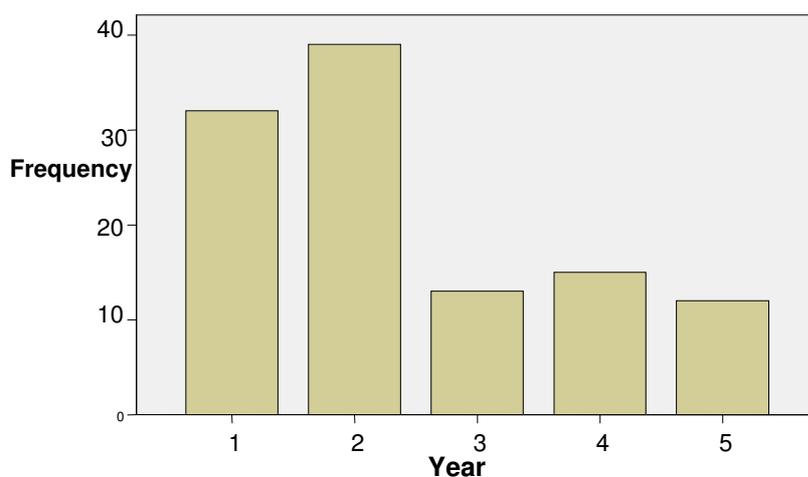


Figure 4.1 Medical sample participants by year of the Bachelor of Medicine program

Gender and age of the sample

The medical sample size of 116 medical students consisted of 68 females (58.6%) and 45 males (38.7%) with 3 participants (0.03%) unspecified. The mean age of the sample was 23 years (SD 5.03 years) and the range of ages was from 17 to 40 years.

Working hours outside of the medical program

Only 53% of the medical sample, (61 participants) responded to the demographic question 'Do you work part time? If so, how many hours per week do you work?' Approximately a quarter of the reporting participants were currently employed, with 42.3% having worked in the past and 57.7% having never been employed.

There was a wide range of working hours, with one participant reporting 48 hours per week outside the study program. The median hours reported by this skewed sample was 4 hours per week.

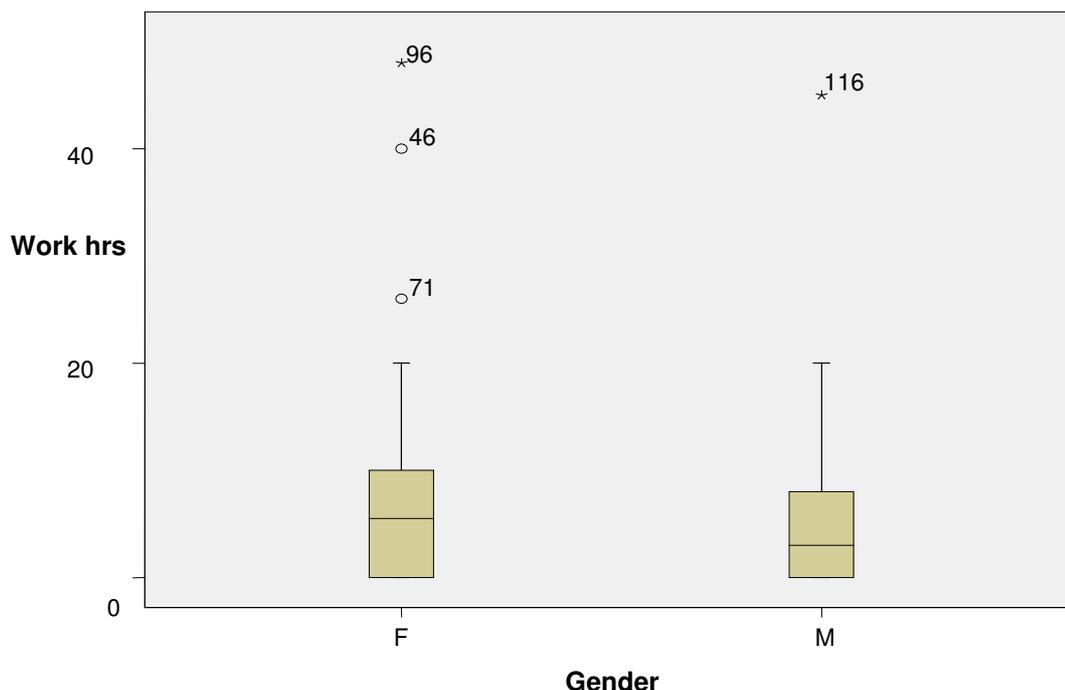


Figure 4.2 Gender and working hours

Note: Box and Whisker plots chart the data laying between the 1st and 3rd quartiles of the data, The median score is represented by a horizontal line across the boxplot.

The highest and lowest scores are represented by the whiskers which extend from the boxplot.

Outliers are marked when a score is greater than 1.5 times the length of the boxplot. In this case the participant number is shown marking scores that lie in the outlier range.

Figure 4.2 demonstrates that female participants reported working more hours per week (median 5.5 hours) than their male counterparts (median 3.0 hours). The range of working hours for the female participants was 0 to 48 hours (SD 11.56 hours), while for the male participants the range was 0 to 45 hours per week (SD 9.67 hours). Overall, 75% of participants in the medical sample worked 10 hours or less per week.

Study hours per week

The medical sample participants from Years 1 to 5 reported a wide range of personal hours of study, ranging from 2 hours to 80 hours per week. The median hours of study per week was 20 hours. Ninety per cent of the medical sample stated that they studied 35.2 hours a week or less, with 10% of the medical sample studying between 35.2 hours and 80 hours per week.

Table 4.1 Study hours per week by year of the Bachelor of Medicine program

Year	N	Missing	Median	SD	Range	IQR
1	32	0	17.84	14.33	78	10
2	37	2	20.00	13.98	56	16
3	12	1	16.00	10.14	31	19
4	15	0	20.00	10.88	41	15
5	11	1	10.00	5.71	16	12

Table 4.1 demonstrates how the mean study hours per year compare across the Bachelor of Medicine program. Within each year, individual students differed markedly in the number of hours they devoted to study each week. The data from Year 1 were normally distributed, while Years 2 to 5 were skewed. Within the medical sample, Year 2 participants reported the highest median study hours per week, ranging from 4 to 60 hours. The lowest median study hours per week was reported by Year 5, ranging from 4 to 20 hours.

To determine whether participants reporting study hours per week that were significantly higher than the average were also employed outside of the Bachelor of Medicine program, a cross tabulation of percentiles of study hours and employment status was performed. Table 4.2 reveals that 11 participants (9.5%) were involved in a greater than average study load while simultaneously being engaged in outside employment. Two participants (1.7%) engaging in 41 to 50 hours week study load also reported being employed.

Table 4.2 Study hours and working hours

Reported study hours per week							
Employed	0-10	11-20	21-30	31-40	41-50	51-60	61-80
Yes	9	14	7	2	2	0	0
34							
No	7	12	11	2	0	1	0
33							

Study hours and gender

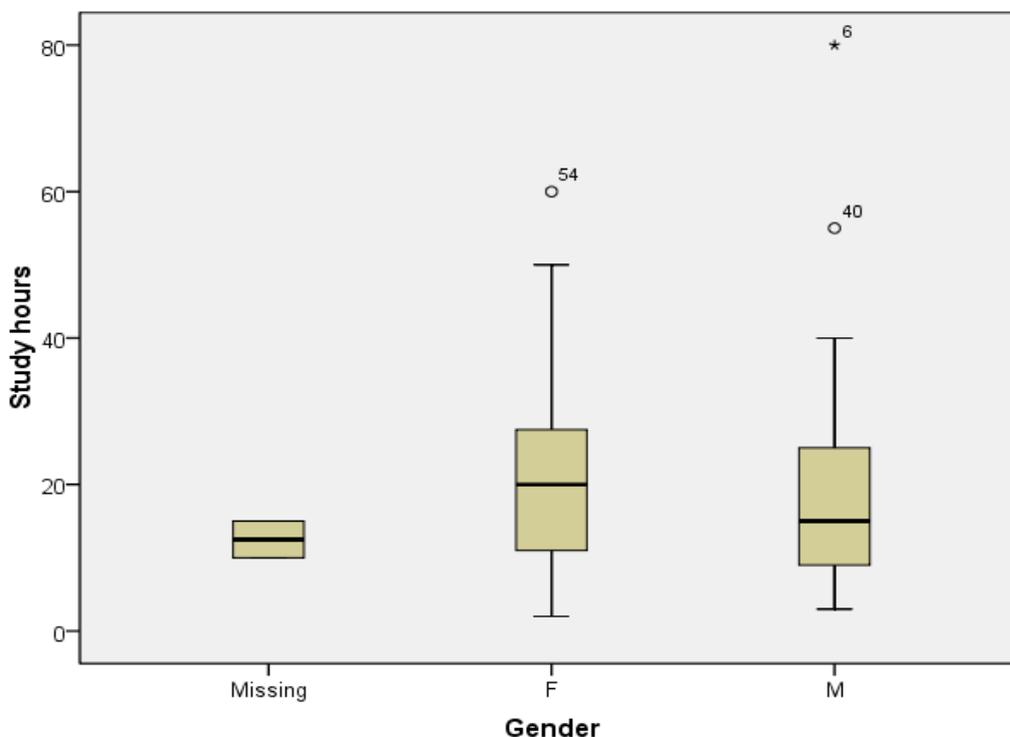


Figure 4.3 Study hours and gender (Years 1 to 5)

As indicated in Figure 4.3, female students reported slightly higher study hours per week than their male counterparts. The median number of study hours per week reported by the female participants in the medical sample was 20 hours per week and ranged from 2 to 60 hours per week. For the male participants in this sample, the median number of study hours was 15 hours per week, with a range of 3 to 80 hours per week.

Living away from home for the first time

Participants were asked 'Are you living away from home for the first time this year?' Here, 63.8% reported No and 30.2% reported Yes, with 6.0% not answering. Of those reporting that they were living away from home for the first time this year, nearly half (49%) were from Year 1, 29% from Year 2, 17% from Year 3, 0.03% from year 4 and 0.03% from Year 5.

Country of origin

The 116 participants originated from 15 countries. Table 4.3 details the numbers from each of these countries, and reveals that Australians comprised the majority of the sample (77.8%). Malaysian students represented the highest proportion of participants from countries outside Australia (5.3%).

Table 4.3 Country of origin of medical sample

Country of origin	N	%
Australia	88	77.80
Malaysia	6	5.30
Hong Kong	3	2.60
UK	2	1.70
India	2	1.70
New Zealand	2	1.70
Taiwan	2	1.70
China	1	0.88
Norway	1	0.88
Japan	1	0.88
Singapore	1	0.88
United States	1	0.88
Ukraine	1	0.88
Afghanistan	1	0.88
Macedonia	1	0.88
Unspecified	3	2.65
Total	116	100.0

Research Question 1(a)

iWAM as a predictor of career choice satisfaction

(a) What specific iWAM Work Motivations might predict career choice satisfaction with the choice of medicine as a career in medical students in the Bachelor of Medicine program at the University of Newcastle, NSW?

Data analysis

Possible relationships between the 48 iWAM Work Motivations and medical students' self-reported career choice satisfaction with their career choice were investigated by producing a correlation matrix between the 48 Work Motivations of the iWAM instrument and the 17 satisfaction with career choice questions. This process was then repeated with the five satisfaction with career choice factors.

To identify the iWAM Work Motivations that might predict career choice satisfaction in medical students, a multiple regression analysis was performed. The total satisfaction scores for the five years of the Bachelor of Medicine program were then analysed using ANOVAs to determine if there was a statistically significant difference in reported career choice satisfaction between the years. Finally, possible relationships between the elements of career choice satisfaction and good and poor outcomes in academic achievement and clinical performance in the Bachelor of Medicine program were investigated. This was achieved by correlating the 17 satisfaction with career choice items and the five satisfaction with career choice factors with participants' academic scores (Years 1 to 4) and clinical scores (Years 2 to 5).

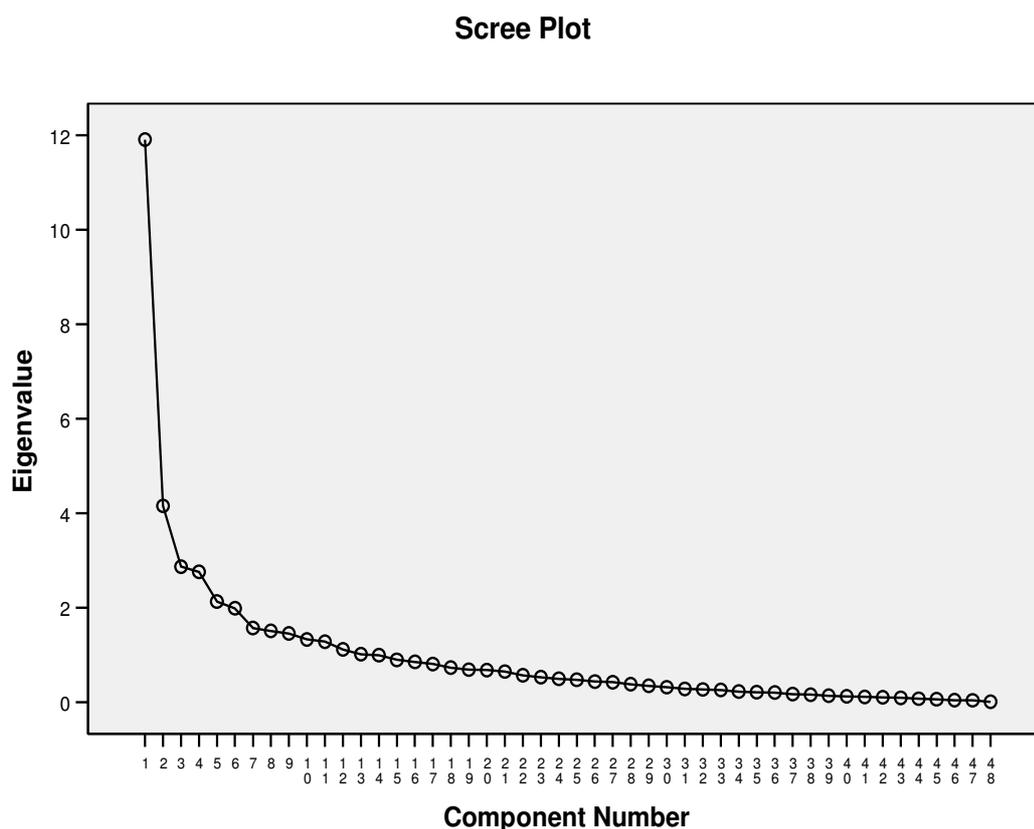
iWAM Factor analysis

The iWAM instrument has been designed to be used for modelling high and low performance and identifying the specific motivations that contribute to each of these outcomes. As such, the instrument comprises a large number of independent and detailed measures rather than broad categories or classifications of measures. For example, this study found that the inter correlations between measures within each pattern category were weak ($r=\pm 0.22-0.27$) confirming the independence of each of the iWAM work motivation measures.

The developer of the iWAM instrument, Patrick Merlevede, stated (in personal communication April 14, 2008) that no meaningful factors were identified in the iWAM questionnaire during the initial validation procedures of the instrument. However, for

the purposes of this research, the iWAM questionnaire was subjected to factor analysis to investigate the developers' unpublished results. Initial analysis involved producing a Scree plot of the iWAM instrument. Figure 4.4 shows five probable factors that may underlie and unify the 48 iWAM Work Motivations that comprise the iWAM instrument.

Figure 4.4 Scree plot for the iWAM factor analysis



A factor analysis of the 48 Work Motivations utilising a five factor solution was performed. This failed to converge after 25 iterations but subsequently converged after 30 iterations. The total variance explained by the five factor solution was 49.64%. Analysis of the five factor solution revealed that 14 iWAM Work Motivations (>0.5) loaded onto Factor 1. These Work Motivations were representative of most of the 16 iWAM categories and yielded no logical or consistent pattern. Ten Work Motivations loaded onto the Factor 2 (>0.5), demonstrating a similar non-logical combination of Work Motivations. Factor 3 comprised four Work Motivations (>0.5) also providing no meaningful.

Finally, Factor 4 encompassed three Work Motivations and Factor 5, two Work Motivations, all with no coherent factor structure.

Further factor analyses using four, six, seven and eight factors were attempted. Each of these revealed similar non-logical clusters of Work Motivations that could not be defined into a meaningful pattern. The results confirmed the developer's intention to construct an instrument of multiple independent measures.

Relationships between individual career choice satisfaction questions and iWAM

Of the 116 participants a total of 72 (65.5%) students completed the online satisfaction with career choice questionnaire. Appendix M demonstrates the correlation matrix between the 17 questions of the satisfaction with career choice questionnaire and the iWAM Work Motivations of the iWAM instrument. As this matrix comprises 1037 cells, a calculation of Type 1 error revealed that Pearson's correlation $r=\pm 0.30$, ($p<0.011$) would be required to minimise the possibility of a chance or incorrect result. An $r\geq 0.30$ would ensure that the probability of a Type 1 error would be less than 11 errors, on average, in the correlation matrix. An $r\geq 0.35$ would be expected to give three Type 1 errors on average, for this matrix. For $n=72$, a correlation of $r=0.23$ is significant

at the $p\leq 0.05$ level. The choice of an $r\geq 0.30$ was based on a compromise between exploration of possible relationships and avoiding too many Type 1 errors.

Table 4.4 Significant correlations between satisfaction with career choice questions and IWAM Work Motivations

Question	1 prefer clinical	2 clinical	5 clinical overwhelm	7 thoughts leaving	8 proc- edures	9 over- whelm	14 accurate pre- conception	16 Difficulties student life
Work motivation								
BP1							-0.42**	
OF2+				-0.31**			0.33**	
OF3+								
OF3-								0.35**
BP5	0.31**	0.30*						
OF6+	0.32**							
OF7+		0.31**			0.40**	0.34	-0.38**	
OF7-								
BP7					-0.33**			
BP8								-0.38**
So1					0.39**	0.40**		
So2						-0.34**		
TP1			0.31**					
TP2					-0.33**			
N1			-0.31**		-0.41**	-0.38**		
N2					0.52**			
N3					-0.33**			
N4								0.33**
Co1					-0.33**	-0.37**		
Co3					0.42**	0.36**		
IF1						-0.32		
IF2			-0.30**					
IF4					-0.37**			
IF5					0.35**	0.36**		
IF7				-0.37*				

Key: * n < 0.05 ** n < 0.01 *** n < 0.001

Relationships between individual satisfaction with career choice questions and iWAM Work Motivations (cont.)

The results of Pearson's correlations demonstrated that 33 iWAM Work Motivations were moderately correlated with constructs from the satisfaction with career choice questionnaire. Nine of the 17 satisfaction with career choice questions were significantly correlated with one or more of the iWAM Work Motivations, while Questions 8 and 9 were both significantly correlated with 10 iWAM Work Motivations. Table 4.4 reveals the 33 significant correlations ($r \geq 0.30$) including six significant correlations at $r \geq 0.40$. These correlations are summarised below: The correlation matrix is displayed as Appendix N.

Question 1: *I am more comfortable with the clinical areas of medicine than the academic areas.*

There were moderate and significant correlations between Group Environment (OF7+, $r = 0.32$) and Task Scope (BP5, $r = 0.31$) and participants' reports of greater comfort with the clinical program. This result demonstrates that as participants' motivation to work with people (OF7+) and their preference for big picture thinking (BP5) increased, they reported greater comfort with the clinical rather than the academic areas of medicine.

Question 2: *The clinical component of the program is a natural fit with my inherent strengths.*

The perception that the clinical program was a natural fit with the student's inherent strengths was significantly, moderately and negatively correlated with the Interest Filter for Tools (IF2, $r = -0.30$). There was also a significant, positive and moderate correlation ($r = 0.31$) with Group Environment (OF7+) and Task Scope (BP5, $r = 0.36$). This question revealed similar results indicating that as participants' motivation to work as part of a team (OF7+) and focus on the big picture (BP5) increased their perception of the clinical program as a natural fit with their strengths increased. A Focus on Tools and Instruments (IF2) was associated with a perception of decreasing fit with the clinical program.

Question 5: *On clinical placements, I am often overwhelmed by the emotional demands of the role.*

The work motivation Assertive Rules (N1) were negatively and moderately correlated with students' perception of being overwhelmed by the emotional demands of their role ($r = -0.31$). There was also a significant, moderate and positive correlation ($r = 0.31$) with Past (TP1).

Therefore, participants' sense of being overwhelmed decreased as they focused on policies and rules and as they were motivated to assert the rules with others (N1). Participants' sense of overwhelm increased as they focused on past experiences (TP1).

Question 7: *I have frequent thoughts of leaving the program.*

There was a significant, moderate and negative correlation ($r = -0.31$) with frequent thoughts of leaving the program and Goal Orientation (OF2+). This question was also significantly, moderately and negatively correlated (-0.37) with the Interest Filter for Time (IF7). These correlations indicate that as participants were more motivated to set goals and plan and schedule their time, their thoughts of leaving the program decreased.

Question 8: *The procedural aspects of clinical medicine are difficult for me.*

Eleven Work Motivations were significantly and moderately correlated with finding the procedural aspects of medicine difficult. Those that achieved a positive correlation included: Indifference (N2, $r = 0.52$), Individual Environment (OF7-, $r = 0.40$), Sameness (So1, $r = 0.39$), Interest Filter for Money (IF5, $r = 0.35$) and Convinced by Reading (Co3, $r = 0.42$). These results indicated that participants' perception of the procedural aspects of medicine being difficult increased as they were indifferent to rules (N2), wanted to work alone (OF7-), were motivated by things staying the same (So1) and were motivated by money (IF5).

Work Motivations that were significantly, moderately and negatively correlated with finding the procedural aspects of medicine difficult were Present (TP2, $r = -0.33$), Assertive Rules (N1, $r = -0.41$), Compliance (N3, $r = -0.33$), Convinced by Seeing (Co1, $r = -0.33$), Work Environment Type (BP7, $r = -0.33$) and Interest Filter for Information (IF4, $r = -0.37$). These results indicate that as participants' remained focused on the present, they were comfortable in asserting the rules with others (N1), they were personally compliant with rules (N3), were convinced by what they saw (Co1), wanting to work in a group or team (BP7) and their interest in information (IF4) increased and so their comfort with the procedural aspects of medicine increased.

Question 9: *I am often overwhelmed by the responsibilities demanded of me as a future doctor.*

Ten Work Motivations were significantly, moderately and positively correlated with participants' perceptions of being overwhelmed by the responsibilities demanded of them as future doctors. These included Individual Environment (OF7-, $r = 0.34$),

Sameness (So1, $r = 0.40$), Convinced by Reading (Co3, $r = 0.36$), Indifference (N2, $r = 0.47$) and Interest Filter for Money (IF5, $r = 0.36$).

These findings indicate that as participants' desire to work alone (OF7-), preference for wanting things to remain the same (So1), indifference to rules (N2), needing to read information or instructions to be convinced (Co3) and interest in financial matters (IF5) increased, their experience of being overwhelmed by the responsibilities of becoming a future doctor increased. Work Motivations that were negatively correlated included Convinced by Seeing (Co1, $r = -0.37$), Evolution (So2, $r = -0.34$), Assertive Rules (N1, $r = -0.38$), Interest Filter for People (IF1, $r = -0.32$) and Interest Filter for Information (IF4, $r = -0.35$). This indicates that as being convinced by what they observed (Co1), being motivated to see progress and growth (So2), interest in people and their feelings (IF1) and interest in gaining knowledge (IF4) increased, a student's perception of being overwhelmed with the responsibilities inherent within becoming a doctor decreased.

The Work Motivations positively correlated with Question 8: *The procedural aspects of clinical medicine are difficult for me* and Question 9: *I am often overwhelmed by the responsibilities demanded of me as a future doctor* were found to have the same cluster of correlates. Given that these two career choice satisfaction questions elicited almost the same correlates, the extent to which the two questions were measuring the same constructs was tested. Question 8 and Question 9 were correlated with each other and found to have a positive correlation of $r = 0.56$. This result indicated that there was a significant, high and positive correlation between finding the procedural aspects of medicine difficult and being overwhelmed by the responsibilities of becoming a future doctor.

Question 14: *My conceptions of the profession of medicine before beginning the program were fairly accurate.*

This question was significantly, moderately and positively correlated with Individual Motives (OF3+, $r = 0.33$) and moderately and negatively correlated with Individual Environment (OF7-, $r = -0.38$) and Action level (BP1, $r = -0.42$). Therefore, as participants' internal frame of reference increased their pre-conceptions showed greater accuracy. As participants' motivation to work alone (OF7-) and focus on being analytical and reflective (BP1) increased, their pre-conceptions became less accurate.

Question 16: *The difficulties of student life are the main cause of any career choice dissatisfaction I experience in becoming a doctor.*

There was a moderate, significant and positive correlation between External (frame of reference, (OF3-, $r = 0.35$), Tolerance (N4, $r = 0.33$) and Work Assignment Type (BP8, $r = 0.31$) and finding student life the main cause of dissatisfaction with the choice of becoming a doctor.

The results demonstrated that dissatisfaction with student life increased as participants took others opinions into account when making decisions (OF3-) and were tolerant of others with behaviour (N4). Additionally, wanting to retain sole responsibility (OF8-) rather than sharing responsibility with a team, also increased dissatisfaction with student life.

Satisfaction with career choice questionnaire factor analysis

Five career choice satisfaction factors were derived by the extraction method: principal component analysis, using Varimax with Kaiser normalization as the rotation method. The rotation converged in eleven iterations. A five factor solution was chosen after examining possible three, four and six factor solutions. The choice of a five factor solution was made because the three factor solution reduced categories to a level of abstraction that lost essential meaning and the four and six factor solutions both contained too many cross-loadings to offer a valid solution. The five factor solution offered only one cross-loading, on Question 9 (*I am often overwhelmed by the responsibilities of becoming a future doctor*). The final factor model explained 62% of the variance in the data with eigen values >1.2 .

The five factor solution

The five factors were named: (i) Wrong career choice (ii) Good fit (iii) Overwhelm (iv) Coping mechanisms and (v) Clinical support. Table 4.5 outlines the five factor solution, summarising the career choice satisfaction items that loaded on each factor.

Table 4.5 The five factor solution

Factor	Career Choice Satisfaction Item	Factor Correlation
1. Wrong career choice	If it were possible to choose my career again I would make medicine my first choice	Negative
	7. I have frequent thoughts of leaving the program	Positive
	10. The difficulties of being a doctor outweigh the satisfaction	Positive
	15. The experience of being a doctor has not been as satisfying as I had hoped	Positive
2. Good fit	8. Procedural aspects of medicine are difficult for me	Negative
	9. I am often overwhelmed by the responsibilities demanded of me as a future doctor	Negative
	13. My conceptions of the profession of medicine before beginning the program were fairly accurate	Positive
3. Not coping	4. The academic load is overwhelming	Positive
	11. The role of being a doctor fulfills a deep need in me I would cope better if the program was more structured	Positive Positive
4. Overwhelm	5. On clinical placements I am often overwhelmed by the demands of the role	Positive
	I am often overwhelmed by the responsibilities demanded of me as a future doctor	Positive
5. Focus on People	1. I am more comfortable with the clinical areas of medicine than the academic areas	Positive
	12. I have a supportive network to help me with the challenges of the program	Positive
	3. The content of the academic program is in line with my personal interests	Positive

Factor 1: Wrong career choice

The wrong career choice factor harnessed participants' assessment on areas that indicated dissatisfaction with their choice of medicine as a career. This included notions of wishing to choose another career other than medicine (Question 6), having frequent thoughts of leaving the program (Question 7), finding that the difficulties of participating in the program were greater than the satisfaction gained (Question 10) and an overall experience that becoming a doctor had not been as satisfying as was hoped (Question 15).

Factor 2: Good fit

The good fit factor pulled together participants' assessments of their fit with various aspects of becoming a doctor. These issues included finding the procedural aspects of medicine difficult. The factor also included feeling overwhelmed by the responsibilities of becoming a doctor. Accurate pre-conceptions of the profession of medicine before commencing the program also loaded on this factor (Question 14).

Factor 3: Not coping

The not coping factor pulled together notions of overwhelm (Question 4), yet deep fulfilment with the role (Question 11) and an assessment on whether the participant might cope better with the program if it were more structured (Question 13).

Factor 4: Overwhelm

The overwhelm factor covered specific notions of feeling overwhelmed in the role. This included feeling overwhelmed by the emotional demands of the role on clinical placements (Question 11) and often feeling overwhelmed by the responsibilities of becoming a future doctor (Question 9).

Factor 5: Focus on people

The focus on people factor pulled together underlying notions of being more comfortable with clinical areas than the academic areas (Question 1), finding the academic areas more in line with their personal interest (Question 3) and having a supportive network to help them cope with the challenges of the program (Question 12). The common theme underlying these three questions was deemed to be the participants' outward focus on people.

Table 4.6 The relationship between the satisfaction with career choice items, their subscales and the five satisfaction factors

Factor/ Subscale	Wrong choice factor	Good fit factor	Not coping factor	Overwhelm factor	Focus on People factor
Perceived fit		8, 14	13		1,3
Dissatisfaction	7, 10, 15				
Overwhelm		9	4	5, 9	
Support					12
Comfort	6		11		

Table 4.6 demonstrates the relationship between the Satisfaction questionnaire items, shown as numerals, the Satisfaction subscales and the five satisfaction factors. Items 2, 16 and 17 did not load on any of the satisfaction factors.

Relationships between the career choice satisfaction factors and iWAM

The data were analysed through producing a correlation matrix between the 48 iWAM Work Motivations and the five satisfaction with career choice factors. A calculation of Type 1 error revealed that a Pearson's correlation of $r = \geq 0.30$ ($p < 0.02$) would ensure that the probability of a Type 1 error would be less than six errors, on average, in the correlation matrix of 280 cells. An $r \geq 0.35$ would be expected to give two Type 1 errors on average, for this matrix. For $n=72$, a correlation of $r = 0.24$ is significant at the .05 level.

Four of the five career choice satisfaction factors achieved significant, moderate correlations with the iWAM Work Motivations and these are summarised below:

Table 4.7 Significant correlations between career choice satisfaction factors and iWAM Work Motivations

Work Motivation	Good fit	Focus on People	Not coping	Wrong career choice
BP2	0.31			
OF6-		-0.34		-0.29
OF7-	-0.39			
N2	-0.35			
Co1	0.38			
Co2	-0.32			
Co3	-0.32			
Co6			-0.35	
IF1	0.35			

iWAM with the wrong career choice factor

The wrong career choice factor was significantly, moderately and negatively correlated with OF6+ Affective Communication ($r = -0.29$). While this correlation was slightly below significance it was indicative of a recurring pattern relating people-focused communication skills with satisfaction with career choice and clinical performance.

iWAM and the good fit factor

The good fit factor was significantly, moderately and positively correlated with Convinced by Seeing (Co1, $r = 0.38$), Focus on Money (IF5, $r = 0.35$) and Action Direction (BP2, $r = 0.31$). This factor was also significantly, moderately and negatively correlated with Individual Environment (OF7-, $r = -0.39$), Indifference (N2, $r = -0.35$), Convinced by Hearing (Co2, $r = -0.32$), and Convinced by Reading, (Co3, $r = -0.32$).

The results signify that participants' perceptions of fit increased as they were convinced by their observations and focused on money. It also indicates that participants' sense of fit decreased as they wanted to work alone, were indifferent to the rules and made decisions based on what they heard and read (rather than what they had observed).

iWAM and the not coping factor

Two iWAM Work Motivations were significantly and moderately correlated with the not coping factor.

These included Convinced Automatically (Co6, $r = -0.35$) which was negatively correlated, while Convinced by Consistency (Co7, $r = 0.29$) was positively correlated with the factor. These results indicate that consistent checking in order to be convinced (Co7) was positively correlated with this factor, while quick and automatic decision making was negatively correlated with this factor.

iWAM and the overwhelm factor

No significant correlations were achieved with this factor.

iWAM and the focus on people factor

This factor was significantly, moderately and negatively correlated with the work motivation, Neutral Communication (OF6-, $r = -0.34$). This result indicates that as participants were increasingly motivated to communicate expressively and notice others' non-verbal language during communication, their focus on people increased. Conversely, as the preference increased for focusing on only the content or words during communication the participant's focus on people decreased.

Critical Work Motivations and relationships with career choice satisfaction items

A Pearson's correlation matrix with the 48 iWAM metaprograms and the 17 satisfaction with career choice questions revealed that eight of the satisfaction questions were not significantly correlated with the iWAM Work Motivations (4, 6, 7, 10, 11, 12, 13,15). For the remaining nine satisfaction with career choice questions, multiple linear regressions were carried out to identify the critical Work Motivations for these satisfaction items. The regression models provide a tool to assess how strongly each significant work motivation factor impacts satisfaction and hence a way to assess the impact of these factors on high and low performing students.

Table 4.8 Regression models relating to the career choice satisfaction questionnaire items and the iWAM Work Motivations, N=72

Satisfaction Question	Work Motivation	B	SE	Beta	p	R ²
1	BP5	2.63	0.76	0.51	0.001	0.33
	OF7+	1.50	0.37	0.45	0.001	
	OF5-	1.53	0.71	0.34	0.036	
	MO1	1.67	0.59	0.31	0.007	
2	OF6+	1.59	0.43	0.40	0.001	0.29
	BP5	1.72	0.49	0.36	0.001	
	Co2	-1.27	0.52	0.26	0.020	
3	OF7-	-1.88	0.36	-0.69	0.001	0.35
	BP3	-1.69	0.42	-0.45	0.001	
	N4	1.21	0.52	0.25	0.023	
	BP6	-0.96	0.44	-0.24	0.030	
	Co5	-1.08	0.53	-0.23	0.045	
5	TP1	3.32	0.75	0.48	0.001	0.35
	Co8	-2.18	0.60	-0.39	0.001	
	OF2-	1.78	0.53	0.35	0.001	
	OF1-	-1.87	0.69	-0.29	0.009	
	Mo2	-1.36	0.55	-0.26	0.015	
8	N2	4.69	0.69	0.80	0.001	0.43
	OF5+	-1.73	0.57	-0.35	0.004	
	BP8	2.07	0.61	0.33	0.001	
	OF5-	-1.53	0.64	-0.28	0.020	
9	N2	2.70	0.62	0.47	0.001	0.22
14	OF7-	-1.46	0.35	-0.15	0.001	0.47
	BP3	-1.46	0.42	-0.37	0.001	
	OF7+	-0.98	0.32	-0.33	0.003	
	OF3+	1.28	0.39	0.31	0.002	
	Mo2	1.03	0.37	0.27	0.007	
	BP1	-1.20	0.46	-0.26	0.010	
16	OF3-	2.77	0.74	0.40	0.000	0.3
	N4	3.10	0.84	0.40	0.000	
	Co3	-1.28	0.43	-0.33	0.004	
17	OF8+	-1.28	0.45	-0.33	0.006	0.2
	Mo3	-1.27	0.49	-0.03	0.000	
	OF5+	-0.95	0.45	-0.24	0.039	

Satisfaction Question	Work Motivation	B	SE	Beta	p	R ²
Total Career Choice Satisfaction Scores						
(Yrs 1 - 5)	N2	17.00	3.50	0.69	0.001	0.33
	BP6	7.12	2.65	0.41	0.010	
	OF3+	9.89	2.56	0.41	0.001	
	N3	9.23	3.69	0.35	0.020	
	So3	-5.28	2.48	-0.23	0.040	

Table 4.8 shows the regression models relating to the career choice satisfaction questionnaire items and the iWAM Work Motivations. In total, seven career choice satisfaction questions, when regressed with the 48 iWAM Work Motivations, achieved R² between 0.20 and 0.47. These are outlined below:

Question 1: *I am more comfortable with the clinical areas of medicine than the academic areas.*

The results demonstrated that participants' comfort with the clinical program increased as their motivation to work in a Group Environment (OF7+), Power (Mo1), big picture focus (BP5) and Details (OF5-) increased. Task Scope (big picture focus, BP5) and Group Environment (OF7+) were the most significant predictors in this model (beta=0.51 and 0.45 respectively).

Question 2: *The clinical component of the program is a natural fit with my inherent strengths*

As participants' motivation to communicate with and notice others' non-verbal language increased (OF6+) and their task scope (big picture thinking, BP5) increased, their perception of natural fit with the clinical program increased. The perception of fit decreased as participants' preference for being convinced by what they heard increased (Co2). Non-verbal communication (OF6+) and focus on the big picture (BP5) were the highest predictors in this model (beta=0.40 and 0.36 respectively).

Question 3: *The content of the academic component of the program is in line with my personal interests*

The model revealed that as participants' tolerance of others' rules and behaviours increased (N4), their perception of fit with the academic program increased.

The model also indicated that decreased fit was associated with wanting to work alone (OF7-), check information a number of times before being convinced (Co5), deciding based on external criteria and communicating with non-verbal language.

Working alone (OF7-) and making decisions based on external criteria (BP3) were the highest predictors in the model with beta scores of -0.69 and -0.45 respectively.

Question 5: On clinical placements, I am often overwhelmed by the emotional demands of the role

The results indicated that frequent feelings of being overwhelmed increased as participants focused on the past (TP1) and focused on problems (OF2-). As participants' preference to take a period of time to be convinced before making a decision (Co8) increased and as they took more time to reflect and think things through and affiliate with others (Mo2) their experience of feeling overwhelmed decreased. Focus on the past and convinced over time were the highest predictors in this model (Beta=0.48 and -0.39 respectively).

Question 8: The procedural aspects of clinical medicine are difficult for me

The model demonstrated that as indifference to rules (N2) and preference for sole responsibility (rather than shared team responsibility) increased, difficulty with clinical procedures increased. As attention to both details (OF5-) and the big picture (OF5+) increased, difficulty with clinical procedures decreased. Indifference to rules (N2) offered a much higher predictive value than the other Work Motivations in the model, with a beta score of 0.80.

Question 9: I am often overwhelmed by the responsibilities demanded of me as a future doctor

The results indicated that as participants' indifference to rules (N2) increased, their sense of feeling frequently overwhelmed by the responsibilities of becoming a doctor increased. The indifference work motivation achieved a beta score of 0.47.

Question 14: My conceptions of the profession of medicine before beginning the program were fairly accurate-

The model indicated that accurate pre-conceptions of the profession increased as participants' internal frame of reference (OF3+) and need for affiliation (Mo2) increased. It also indicated that as participants' motivation to focus on their working environment, whether it be in a group or alone (OF7+ and OF7-) increased, they preferred to make decisions by referring to others (BP3) and were reflective (BP1) and their accurate preconceptions of the profession decreased.

The highest (negative) predictors in this model were wanting to work alone (OF7-) and making decisions by referring to others, with beta scores of -0.51 and -0.37 respectively.

Question 16: *The difficulties of student life are the main cause of any dissatisfaction I experience in becoming a doctor*

The results indicated that as participants required external input to make a decision (OF3-) and their tolerance of others' rules increased (N4), their experience of student life being the main cause of dissatisfaction increased. Citing student life as the main cause of dissatisfaction decreased as participants' preference for being convinced by reading (Co3) increased. Both external frame (OF3-) and tolerance (N4) were the highest predictors in the model (beta=0.40).

Question 17: *I find small group work a satisfying way of learning*

The regression results showed that the motivations of achievement (Mo3), sole responsibility (OF8+) and big picture thinking (OF5+) were negatively correlated with reporting small group learning a satisfying way of learning. The highest predictors in this model were sole responsibility (OF8+) and achievement with beta scores of -0.33 and -0.28 respectively.

Critical Work Motivations and satisfaction with career choice factors

Four of the five satisfaction with career choice factors were regressed with the 48 iWAM Work Motivations and achieved R^2 values between 0.12 and 0.37. Factor 4 did not achieve a significant result. The results are displayed in Table 4.8.

Table 4.9 Critical Work Motivations and satisfaction with career choice factors
N=72

Work Motivation	Description	B	SE	Beta	p	R ²
Factor 1: Wrong career choice						
OF6+	Affective Communication	-8.63	1.84	-0.67	0.001	0.37
OF7-	Individual Environment	5.89	1.54	0.58	0.001	
BP6	Communication Style	5.74	2.23	0.38	0.01	
IF7	Interest in Time	-4.93	1.96	-0.30	0.02	
OF4-	Procedures	-3.17	1.68	-0.21	0.07	
Factor 2: Good fit						
IF1 0.43	Focus on People	7.07	1.58	0.61	0.001	
OF7-	Individual Environment	-3.32	0.93	-0.43	0.001	
BP6	Communication Style	-4.82	1.69	-0.42	0.01	
Mo1	Power	3.64	1.35	0.31	0.01	
IF4	Focus on Information	2.94	1.35	0.25	0.03	
Factor 3: Not Coping						
Co6 0.12	Convinced Automatically	-3.39	1.21	-0.35	0.01	
Factor 5: Focus on People						
TP2 0.27	Present	-3.39	1.02	-0.47	0.002	
OF6+	Affective Communication	4.27	1.31	-0.38	0.002	
BP3	Evaluation Reference	2.72	1.19	0.32	0.03	

Factor 1: Wrong career choice

The Work Motivations that positively predicted this factor were preferring to work alone (OF7-) and a focus on the content, rather than the expressive or non-verbal aspects of communication (BP6). The results also indicated that focus on non-verbal aspects of communication (OF6+), procedures and planning and allotting time schedules were negative predictors of wrong career choice. The highest predictor in the model was Affective Communication (OF6+, $\beta = -0.67$).

Factor 2: Good fit

The regression analysis revealed that a focus on people (IF1), not wanting to work alone (OF7-), focusing on power and leadership, focus on the content of the communication and a focus on knowledge and information were the predictors of the factor good fit. Focus on people was the highest predictor in this model ($\beta = 0.61$).

Factor 3: Not coping

The not coping factor was negatively predicted by the work motivation convinced automatically, indicating that as participants made decisions quickly they coped more effectively. This work motivation achieved a beta score of -0.35.

Factor 5: Focus on people

The focus on people factor was negatively predicted by not being in the present (TP2), by not being focused on peoples' emotions and non-verbal signals (OF6+) and by making decisions based on one's own criteria and values, rather than by referring to others (BP3). The highest predictor for this factor was not being in the present ($\beta = -0.47$).

Critical Work Motivations for total career choice satisfaction scores

To identify the highest predictors for satisfaction with career choice (critical Work Motivations), the total satisfaction scores for participants from Years 1 to 5 were subjected to multiple linear regressions with the iWAM Work Motivations. The best model, explaining 33% of the variance for career choice satisfaction, is outlined in Table 4.10.

Table 4.10 Critical Work Motivations for predicting career choice satisfaction in the Bachelor of Medicine program

Work Motivation	Description	B	SE	Beta	p	R ²
N2	Indifference	17.00	3.50	0.69	0.001	0.33
BP6	Communication Style	7.12	2.65	0.41	0.010	
OF3+	Individual Motives	9.89	2.56	0.41	0.001	
N3	Compliance	9.23	3.69	0.35	0.020	
So3	Difference	-5.28	2.48	-0.23	0.040	

Five Work Motivations were found to be the critical predictors for satisfaction with career choice for participants in the Bachelor of Medicine program from Years 1 to 5. The results demonstrated that indifference to rules (N2), a preference for communicating with non-verbal communication (BP6), making decisions through one's internal frame of reference (OF3+), compliance to policies and rules and a negative desire for change (So3) were the critical predictors of career choice satisfaction in the Bachelor of Medicine program. The most significant predictor for satisfaction with career choice was indifference to rules (N2, beta= 0.69).

iWAM as predictor of academic achievement

Question 1 (b)

What specific iWAM Work Motivations might predict academic achievement in medical students in the Bachelor of Medicine program at the University of Newcastle, NSW?

Correlations between iWAM Work Motivations and academic achievement

The data were initially analysed using Pearson's correlations between the iWAM Work Motivations and academic scores for Years 1 to 4. The academic component of the program is completed at the end of Year 4 and does not extend into Year 5, where the focus is totally on clinical placements. To identify the critical Work Motivations that predict academic achievement in the Bachelor of Medicine program a multiple regression analysis using iWAM scores and semester academic scores was performed. The regression models assessed the strength of significant iWAM Work Motivations upon academic performance, defining the motivations that impact upon student performance in this area.

Descriptive statistics for academic achievement

The analysis of the data was based on the academic scores for 87 participants from Years 1 to 4. The scores ranged from 31 to 93 indicating a wide variation in participants' scores across the Bachelor of Medicine program. The distribution of these scores is displayed in Figure 4.5 and shows that almost all participants gained scores higher than 50.0 and less than 95.0.

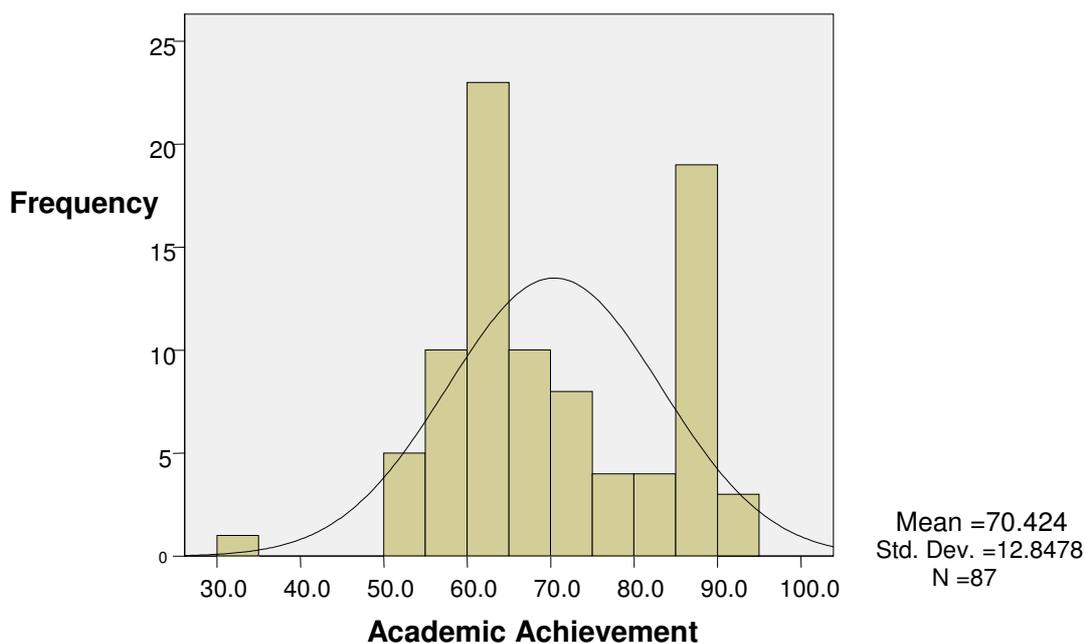


Figure 4.5 Spread of academic marks (Years 1 to 4)

A comparison of academic scores between Years 1 to 4 is displayed in Table 4.10 revealing a significant difference between Year 1 and the remaining three years of the program. The comparison was performed because Year 1 assessment methods differed from Years 2 to 4.

Table 4.11 Academic scores by year of the Bachelor of Medicine program

BMed Year	Mean Academic Score	N	SD
1	85.61	28	5.83
2	62.40	38	7.53
3	64.17	10	9.58
4	65.72	11	8.43

A one way ANOVA confirmed the difference between the years ($p < 0.001$).

Relationships between the iWAM Work Motivations and academic scores in the Bachelor program

The correlation between the iWAM Work Motivations and the academic scores for Years 1 to 4 were initially explored and then compared with the correlations from Years 2 to 4. Table 4.12 and Table 4.13 displays the significant correlations for these two sample groups.

Table 4.12 Correlations between academic achievement Years 1 to 4 and iWAM Work Motivations

Work Motivation	Description	r	P
TP2	Present	0.27	0.04
OF4+	Alternatives	-0.26	0.05

Table 4.13 Correlations of iWAM Work Motivations with Years 2 to 4 academic achievement scores

Work Motivation	Description	r	P
Co5	Convinced by a number of examples	0.30	0.02
OF7+	Group environment	0.28	0.04
OF4-	Procedural thinking	-0.27	0.04
Co3	Convinced by reading	-0.26	0.05

From Table 4.13 (without Year 1) it can be seen that four iWAM Work Motivations were significantly correlated with academic achievement. These results indicated that academic scores increased as participants were convinced by a number of different examples of information and preferred to work in a group environment. As participants preferred to rely on procedures and the material they read in order to be convinced, their academic scores decreased.

Given the statistically significant difference between Year 1 and Years 2 to 4, the reliability of the data analysis with the inclusion of Year 1 was questioned. Additionally, the similarity of mean scores between Years 2, 3 and 4 and the difference in the assessment process for Year 1 from the following three years of the program, resulted in the decision to focus the data analysis for academic achievement on Years 2 to 4.

Critical Work Motivations for academic achievement for Years 2 to 4

A multiple regression analysis of the iWAM Work Motivations and the academic scores for Years 2 to 4 was then performed, to identify any Work Motivations that might predict academic achievement in these years.

Table 4.14 Critical Work Motivations for academic achievement Years 2 to 4

Work Motivation	Description	B	SE	Beta	p	R ²
IF2	Focus on Tools	-11.45	3.64	-0.39	0.01	0.35
Co3	Convinced by Reading	-7.87	2.81	-0.38	0.010	
Co7	Convinced by Consistency	-12.55	4.03	-0.37	0.010	
BP7	Work Environment Type	10.32	4.11	0.31	0.020	

The model revealed four critical Work Motivations for academic achievement for Years 2 to 4, with the model explaining 35% of the variance for academic achievement. The results revealed that participants' academic scores decreased as their motivation to focus on tools and instruments (IF2), read something in order to be convinced (Co3) and check data consistently (Co7) increased. Academic scores increased as participants' focus on working in a group environment (BP7) increased. Work Motivations receiving the highest beta scores were Focus on Tools (IF2, beta= -0.39) and Convinced by Reading (Co3, beta= -0.38).

iWAM as predictor of clinical performance

Question 1(c)

What specific IWAM Work Motivations might predict clinical performance in medical students in the Bachelor of Medicine program at the University of Newcastle, NSW?

Correlations between iWAM Work Motivations and clinical performance

The data were analysed by using Pearson's correlation between the 48 iWAM Work Motivations and the clinical performance scores for Years 2 to 5. To identify the critical iWAM Work Motivations that might predict clinical performance in medical students, a multiple regression analysis was performed. The regression models then identified those Work Motivations that varied most between the high and low performing participants in clinical performance.

Work Motivations and clinical performance

The clinical program at the University of Newcastle runs from Years 2 to 5, excluding Year 1. The descriptive statistics for clinical scores for Years 2 to 5 showed that there was a large range of scores (47.0), with a minimum score of 40.5 and maximum score of 87.5 (SD 11.33). This is visually depicted in Figure 4.6 which demonstrates the spread of clinical scores over the five years of the program. Further analysis revealed that the median score for the sample was 67% with a quarter of the participants scoring 58% or less, three quarters 74% or less and the final quarter of participants scoring between 74% and 88%.

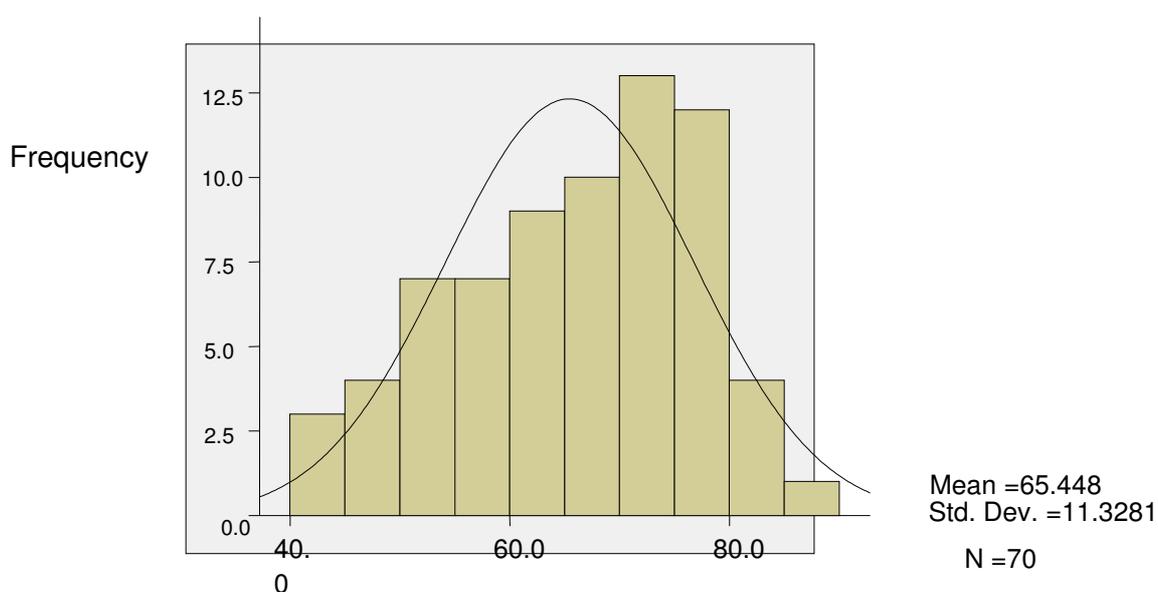


Figure 4.6 Spread of clinical performance scores (Years 2 to 5)

The means of the four years of the clinical program were then analysed using ANOVAs and were found to be weakly statistically significantly different ($p < 0.011$). Table 4.15 outlines the mean scores for clinical performance for Years 2 to 5.

Table 4.15 Clinical performance by year, Bachelor of Medicine program

BMed Year	Mean Clinical Score	N	SD
2	62.73	38	11.97
3	73.23	10	4.97
4	62.08	11	11.67
5	71.14	11	7.70

Given the small differences in scores between the years, all the clinical scores were treated as a whole.

Table 4.16 Significant correlations clinical performance (Years 2 to 5) and iWAM Work Motivations

Work Motivation	Description	r	p
TP2	Present	-0.34	0.01
IF2	Focus on Tools	-0.32	0.01
Co7	Convinced by Consistency	-0.31	0.01
N1	Assertive Rules	-0.29	0.02
TP1	Past	0.29	0.02
Co3	Convinced by Reading	0.27	0.03
Co4	Convinced by Doing	-0.27	0.03

Eight Work Motivations were significantly and moderately correlated with clinical performance scores, as demonstrated in Table 4.16. Positively correlated Work Motivations included Past (TP1), Convinced by Reading (Co3) and Automatic Convincer (Co6). The negatively correlated Work Motivations included Present (TP2), Focus on Tools (IF2), Convinced by Consistency (Co7), Assertive Rules (N1) and Convinced by Doing (Co4).

The results demonstrate that as participants' motivation to focus on what they had learned in the past and were convinced by what they read increased, their clinical performance scores also increased. Conversely, the motivations that had an inverse relationship with clinical performance scores were focusing on the present, focusing on tools and instruments, checking consistently in order to be convinced, imposing one's rules on others and needing to do something in order to be convinced.

Critical Work Motivations for clinical performance

A multiple regression analysis of the iWAM Work Motivations and the clinical scores for Years 2 to 5 was then performed to identify any Work Motivations that might predict clinical performance in these years.

Table 4.17 Regression model clinical performance (Years 2 to 5) and the 48 iWAM Work Motivations

Work Motivations	B	SE	Beta	p	R ²
TP2	-19.2	5.40	-0.55	0.001	0.25
Co7	-17.9	5.80	-0.35	0.003	
N2	-15.6	7.30	-0.33	0.040	

The best model to explain clinical performance explained 25% of the variance for clinical performance grades. The model revealed that there was a negative correlation between clinical performance scores and focusing on the present (TP2), being convinced by needing to constantly check (Co7) and indifference (N2). The work motivation that was the highest (negative) predictor of clinical performance was focusing on the present (beta= -0.55).

Summary of critical Work Motivations for the three outcome areas

Table 4.18 summarises the Work Motivations found to be predictive of performance in the three outcomes areas for this study: academic and clinical grades and satisfaction with career choice.

Table 4.18 Summary of critical Work Motivations for the three outcome areas

Work Motivation	Description	Total Satisfaction Beta score	Academic Achievement	Clinical Performance
OF3+	Individual Motives	0.41***		
BP6	Communication Style	0.41***		
BP7	Work Environment Type		0.31**	
So3	Difference	-0.23*		
TP2	Present			-0.55***
N2	Indifference	0.69***		-0.33*
N3	Compliance	0.35**		
Co3	Convinced by Reading		-0.38**	
Co7	Convinced by Consistency		-0.37**	-0.35***
IF2	Focus on Tools		-0.39**	

Key: * $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

Samples: Career choice satisfaction Years 1 to 5, academic achievement Years 2 to 4, clinical performance Years 2 to 5.

The results indicated that Indifference (N2) was the highest predictor of satisfaction with career choice, while the negatively correlated Focus on Tools (IF2) was the best predictor of academic achievement. The work motivation found to be the highest (negative) predictor of clinical performance was Present focus (TP2).

Correlation between academic achievement and clinical performance

The scores for academic and clinical performance were correlated. The weak correlation ($r= 0.29$) between these areas of the Bachelor of Medicine program demonstrated that these two areas could be treated as separate areas.

Critical Work Motivations and demographic variables

Question 2:

Do the critical Work Motivations for satisfaction with career choice, academic achievement and clinical performance remain critical when seven demographic variables for medical students in the Bachelor of Medicine program are introduced as co-variates?

This research question deals with each of the outcome variables (satisfaction with career choice, academic achievement and clinical performance) in turn to produce a final regression model for each, which incorporates the most significant predictors for good outcomes in the Bachelor of Medicine program. This was achieved by entering the identified critical Work Motivations for each of the three major dependent variables in turn, into a regression model. The demographic variables were then entered one at a time for each dependent variable, to determine if the Work Motivations remained the critical predictors of the dependent variable or the model was better explained by adding the demographic variable(s).

Demographic questions included:

1. What year of the Bachelor of Medicine program are you currently undertaking?
2. Gender
3. Country of origin
4. Work country
5. Do you work part time?
6. If so, how many hours per week do you work?
7. On average, how many hours do you devote to study per week (including class time)?
8. Are you living away from home for the first time this year?

Final models for career choice satisfaction, academic achievement and clinical performance

(i) Satisfaction with career choice

The demographic variables gender, work country, origin country, study hours, employed, work hours and away from home for the first time were entered one at a time, with the existing critical Work Motivations for satisfaction, into a regression model. None of these variables replaced any of the critical Work Motivations and the final model remained unchanged. The final model for predictors of satisfaction with career choice is displayed in Table 4.19.

Table 4.19 Final model predicting career choice satisfaction in the Bachelor of Medicine program

Predictors	Description	B	SE	Beta	p	R ²
N2	Indifference	17.00	3.50	0.69	0.001	0.33
BP6	Communication Style	7.12	2.65	0.41	0.010	
OF3+	Motives	9.89	2.56	0.41	0.001	
N3	Compliance	9.23	3.69	0.35	0.020	
So3	Difference	-5.28	2.48	-0.23	0.040	

(ii) Final model for academic achievement

When each of the demographic variables were entered into the regression model one at a time with the critical Work Motivations, none of the new variables attained sufficient significance to replace any of the critical Work Motivations and the final model remained unchanged. The final model for predicting academic achievement in the program is displayed as Table 4.20.

Table 4.20 Final model predicting academic achievement in Bachelor of Medicine program

Predictors	Description	B	SE	Beta	p	R ²
IF2	Focus on Tools	-11.45	3.64	-0.39	0.01	0.35
Co3	Convinced by Reading	-7.87	2.81	-0.38	0.01	
Co7	Convinced by Consistency	-12.55	4.03	-0.37	0.01	
BP7	Work Environment Type	10.32	4.11	0.31	0.02	

(iii) Final model for clinical performance

The critical Work Motivations for clinical performance included Convinced by Consistency (Co7), Indifference (N2), and Present focus (TP2) explaining 25% of the variance for clinical performance. Each of the demographic variables was entered into the regression model for clinical performance with the existing co-variates. A model which increased the variance to 32% included the three existing Work Motivations and the demographic variable gender.

Table 4.21 Final model predicting clinical performance in the Bachelor of Medicine program

Predictors	Description	B	SE	Beta	p	R ²
CO7	Convinced by Consistency	-17.49	5.57	-0.34	0.003	0.32
TP2	Present Focus	-19.94	5.16	-0.57	0.000	
N2	Indifference	-15.04	7.07	-0.32	0.040	
Gender	Female	-5.77	2.34	-0.26	0.020	

The final model to explain clinical performance included the existing critical Work Motivations. All four of the predictors were negatively correlated with clinical performance. The highest predictor overall was present focus (beta= -0.57), with the revised demographic variable gender being the weakest predictor (beta=-0.26).

Summary of final model for the three outcome areas

The summary Table 4.22 outlines the final models which explain satisfaction with career choice, academic achievement and clinical performance with participants in the Bachelor of Medicine program.

Table 4.22 Summary of predictors for career choice satisfaction, academic achievement and clinical performance in the Bachelor of Medicine program

Predictor	Description	Satisfaction with career choice /beta score	Academic Achievement	Clinical Performance /beta score
Career choice				
Satisfaction				
N2	Indifference			0.69***
	Communication			
BP6	Style			0.41***
OF3+	Individual Motives			0.41***
N3	Compliance	0.35**		
So3	Difference	-0.23*		
Academic				
Achievement				
	Convinced by			
Co7	Consistency			-0.37**
IF2	Focus on Tools			-0.394**
	Convinced by			
Co3	Reading			-0.38**
	Work Environment			
BP7	Type			0.31**
Clinical				
Performance				
TP2	Present			-0.55***
N2	Indifference			-0.33*
	Convinced by			
	Consistency			-0.35***
Gender	Female			B 5.8#

Key: * p≤ 0.05 ** p≤0.01 *** p≤ 0.001

This is not a beta score but the mean difference in clinical performance due to female gender related to male gender

Change in critical metaprograms over five-year program

Question 3:

To what extent do the critical Work Motivations for each of the three areas (career choice satisfaction with the choice of medicine as a career, academic achievement and clinical performance) modify in response to the five-year Bachelor of Medicine program?

The critical Work Motivations for each of these three dependent variables were analysed using ANOVA to determine if there were statistically significant changes between the mean scores of the Work Motivations from Years 1 to 5 in the medical program. Following a significant ANOVA the Tukey multiple comparison method was used. This was carried out to determine if the Bachelor of Medicine program exercised a 'training in' effect for the critical ways of thinking identified as significant predictors, for the three outcome variables.

The results of the ANOVAs are displayed in Table 4.23. The table is organised to note the changes in the mean scores from Years 1 to 5. In total, four of the total of ten critical Work Motivations revealed a statistically significant shift throughout the five-year program, some appearing on two of the outcome variables. These Work Motivations were Convinced by Consistency (Co7, $p < 0.003$, academic achievement and clinical performance), Indifference ($p < 0.001$, satisfaction with career choice and clinical performance), Present (TP2, $p < 0.001$, clinical performance) and Convinced by Reading (Co3, $p < 0.01$, academic achievement).

Table 4.23 Changes in critical Work Motivations for career choice satisfaction, academic achievement and clinical performance from Years 1 to 5

Work Motivation	Description	Significant Time Effect Mean Difference /p value	Change from Years 1 to 5
Satisfaction with career			
N2	Indifference Communication	p<0.001	-0.18, p<0.001
BP6	Style Individual		p<0.12
OF3+	Motives		p<0.08
N3	Compliance	p<0.06	
So3	Difference	p<0.31	
Academic Achievement			
Co7	Convinced by Consistency	p<0.003	0.16, p<0.003
IF2	Focus on Tools		p<0.55
Co3	Convinced by Reading Work Environment	p<0.001	-0.28, p<0.01
BP7	Type		p<0.25
Clinical Performance			
TP2	Present	p<0.001	0.30, p<0.001
N2	Indifference	p<0.001	-0.18, p<0.001
Co7	Convinced Consistently	p<0.003	0.16, p<0.003

Critical Work Motivations exhibiting a significant shift during the medical program

(i) Indifference (N2)

Table 4.24 Comparison of the means of Indifference (N2) for Years 1 to 5

Year	N	Mean	SD
1	32	0.11	0.39
2	37	0.23	0.26
3	13	0.36	0.25
4	15	0.12	0.11
5	11	0.29	0.16

Indifference (to rules) was found to be a negative predictor of satisfaction with career choice and clinical performance in the program. Table 4.24 outlines the mean scores for this work motivation from Years 1 to 5. Indifference scores rise sharply in Years 1 and 2 and peak at Year 3, falling sharply for Year 4 and rising again in Year 5.

Multiple comparison tests using the Tukey method revealed that Year 3 was significantly different from all years ($p < 0.003$ – $p < 0.02$) except Year 5 ($p < 0.93$). Year 3 represents the first major clinical exposure for medical students where they are placed in various placements around the state of New South Wales, while Year 5, the final year of the program, is totally focused on clinical placement.

(ii) Convinced by Consistency (Co7)

Table 4.25 Comparison of means of Convinced by Consistency (Co7) for Years 1 to 5

Year	N	Mean	SD
1	32	0.65	0.18
2	37	0.66	0.19
3	13	0.47	0.27
4	15	0.70	0.14
5	11	0.49	0.27

Convinced by Consistency (consistent checking) was found to be a negative predictor to both academic and clinical performance in the Bachelor of Medicine program.

Table 4.25 demonstrates the mean scores for Years 1 to 5, revealing that the focus on constantly checking is high in Years 1 and 2, dropping significantly for Year 3, peaking in Year 4 and falling again in Year 5. Multiple comparison tests (Tukey - $p < 0.04$) but was not significantly different from Year 5 ($p < 0.98$).

(iii) Convinced by Reading (Co3)

Table 4.26 Comparison of the means of Convinced by Reading (Co3) for Years 1 to 5

Year	N	Mean	SD
1	32	0.29	0.29
2	37	0.36	0.31
3	13	0.70	0.27
4	15	0.28	0.37
5	11	0.57	0.35

Convinced by Reading (Co3) was a negative predictor for academic achievement in the Bachelor of Medicine program. Table 4.26 outlines the means of this work motivation for Years 1 to 5. The means for Years 1 and 2 showed a low focus on needing written information to be convinced, followed by a highly significant rise in Year 3, returning to low levels in Year 4 and a significant rise in Year 5.

Multiple comparison tests (Tukey method) revealed that Years 1, 2 and 4 were not significantly different from each other. Year 3 however, showed a highly significant difference ($p < 0.001$) from these years, with Year 5 showing a slight difference ($p < 0.07$) from Year 3

(iv) Present Focus (TP2)

Table 4.27 Comparison of the means of Present (TP2) for Years 1 to 5

Year	N	Mean	SD
1	32	0.76	0.19
2	37	0.66	0.30
3	13	0.38	0.27
4	15	0.66	0.26
5	11	0.46	0.37

Present (TP2) was a negative predictor of clinical performance in the Bachelor of Medicine program. Table 4.27 demonstrates the mean differences for Present Focus (TP2) between Years 1 to 5. The mean scores for Present focus revealed high mean scores for Years 1 and 2, with Year 3 recording the lowest score, Year 4 rising back to Year 2 levels and Year 5 dropping to a moderate score. Multiple comparison tests using the Tukey method demonstrated significant differences between Year 3 and Years 1, 2 and 4 ($p < 0.001$ - $p < 0.05$). There was no significant difference found between Year 3 and Year 5 ($p < 0.94$).

Overall, the four Work Motivations that changed significantly over the five-year program had each been identified as negative predictors of success in the program. The Work Motivations that were subject to change throughout the medical program demonstrated that they were either amenable to a possible training effect, or were responsive to context changes in the medical program.

5

Discussion

This study was designed to assess the predictive validity of Work Motivations (as measured by the iWAM instrument) in academic and clinical performance areas and student satisfaction with their career choice. The study also assessed whether these identified critical Work Motivations would be naturally developed during the five-year medical program or whether, conversely, they represented innate attributes of the students. This chapter explores the main findings from the research for the medical student study.

The main finding was that the iWAM instrument identified clusters of Work Motivations that are predictive of both good and poor outcomes in academic and clinical performance and satisfaction with career choice in the Bachelor of Medicine program. Critical Work Motivations, which effectively differentiated the motivation styles of the high and low performing students, were isolated by utilising multiple linear regressions with data from the three outcome variables and iWAM questionnaire results.

Research Question 1:

(a) Satisfaction with the choice of medicine as a career: Critical Work Motivations

The final regression model for satisfaction explained 33% of the variance in medical student satisfaction with career choice. It is notable that all of the significant Work Motivations remained unchanged in the model after seven demographic and environmental variables were introduced, which substantiates their predictive potential.

The total scores for satisfaction with career choice (Years 1 to 5 medical student sample), when analysed with the iWAM data, revealed five critical Work Motivations associated with overall satisfaction with career choice. The five Work Motivations focus primarily on students' relationship to the policies and rules that they encounter (N2 Indifference, N3 Compliance, OF3+ Individual Motives), their focus in communication (OF6+ Affective communication style) and their relationship to change, specifically the rate of change (So3, Difference).

The motivational profile of a student reporting high levels of satisfaction with the career choice of medicine

The critical Work Motivations describe the most satisfied students in the program as those who are generally not rule bound and who would not unquestioningly accept or follow rules and policies (N2) imposed upon them. However, they are likely to be tolerant or non judgemental of the behaviour of others. These individuals would tend to make decisions about rules they are confronted with by assessing them with their own values and beliefs (OF3+). Further, satisfied students would not consider it necessary to refer to others or external sources (such as rules or policies) when making a decision, as the criteria for decision making would be seen to rest within themselves (OF3+). The appearance of the Compliance (N3) Work Motivation amongst the critical factors implies that satisfied students will comply (N3) when they see it as appropriate and important (e.g. following an important medical procedure) but ultimately they are more likely to decide for themselves (N3, N2, OF3+) rather than following orders because they are orders. This implies that satisfied students possess a strong internal frame of reference and are likely to evaluate situations as they arise and follow through with behaviours which arise from their values.

Another fundamental attribute of highly satisfied students is that they are likely to be expressive communicators, affective and skilled at building rapport in conversations. Affective communicators view the communication process as not only what is being said but also what is unsaid, but expressed by non-verbal language (OF6+).

The results demonstrated that satisfied students are not motivated by quick and successive changes; it is inferred that manageable change and growth is preferred (So3). This may imply that rapid, short placements could lead to decreasing motivation and stress.

Other contributors to career choice satisfaction

While the combined total scores for satisfaction offer insight into primary Work Motivations found in the students experiencing the highest levels of career choice satisfaction, the 17 individual questions from the satisfaction with career choice questionnaire offered more specific information on the student experience. As the satisfaction factors overall did not yield a good factor structure, the analysis for the area of satisfaction with career choice is focused on both the total satisfaction scores and the results from the satisfaction with career choice questionnaire items.

Critical Work Motivations for areas of satisfaction measured by the satisfaction with career choice questionnaire were found in 9 of the 17 satisfaction items. In total 16 Work Motivations and an additional 4 BP scores (which is the averaged score for a pattern category) were found to be significant in terms of being satisfied with career choice. Significant patterns arising from these findings are discussed below.

(i) Difficulties with medical procedures and the experience of being overwhelmed

Multiple linear regressions identified two critical Work Motivations associated with reporting difficulty with procedures (satisfaction item 8). These students scored high in wanting to be solely in charge of their own actions and in a disregard for rules and policies (Sole Responsibility OF8+; Indifference N2).

Being overwhelmed with the future role of becoming a doctor (satisfaction item 9) was predicted by the Work Motivation Indifference (N2) which explained 22% of the variance for this question. This result reinforces the influence of disregarding the rules and policies on the state of overwhelm. As described earlier in this chapter, finding the procedural aspects of medicine difficult and also being overwhelmed by the responsibilities of becoming a future doctor were strongly associated with each other ($r = 0.56$). Further, students who reported feeling overwhelmed by the emotional demands of the role (satisfaction item 5) had high scores on focusing on difficulties and problems as well as associating into past memories (Problem focus, OF2-; Past, TP1).

Overall, the profile of a student feeling overwhelmed and having difficulty performing procedures is likely to be someone who is strong willed, prefers to be in charge of themselves (OF8+) and does not like being confined by policies (N2). These motivational styles may result in a feeling of disconnection from the team. Additionally, an overwhelmed student may also have a tendency to focus on the negative aspects of a situation, particularly remembering past difficulties and challenges (OF2-; TP1), which may overwhelm the student in the present, jeopardising the possibility of resourceful actions.

(i) Profile of students reporting comfort with medical procedures and overwhelm

Multiple linear regressions revealed that students who were comfortable with medical procedures (satisfaction item 8) were focused on the scope of the task (Depth, OF5- ; Breadth, OF5+) being motivated to look at both the big picture of the procedures (possibly its importance to patients' recovery or comfort) and also focusing on the specific steps and details inherent within the procedure.

Students who reported comfort with the emotional demands of the role are less likely to be rushed into immediate action in clinical situations, rather they allowed themselves time and space to think things through before making a decision (Convinced over a Period of time, Co8; Reflecting and patience, OF1-). Another significant predictive factor was that these students were motivated to feel part of the team, where belonging was a primary motivation in the role (Affiliation, Mo2). It could be argued that this sense of belonging to a larger team may help to share the emotional burden and provide a framework of support for students.

Overall, students who are motivated to follow procedures and do not experience a sense of being overwhelmed may exhibit a more calm and grounded approach under pressure and feel supported by being part of the larger team.

Correlations of the satisfaction questions and iWAM Work Motivations

A number of additional patterns emerged from the correlations with the satisfaction with career choice questionnaire and the iWAM Work Motivations. Interestingly, the two Work Motivations that were individually correlated with three of the satisfaction items (Individual Environment, OF7-; Assertive Rules, N1) were also both strongly associated with both the sense of overwhelm with becoming a doctor (satisfaction item 9) and the difficulty involved in performing medical procedures (satisfaction item 8).

Correlation results indicated that feeling overwhelmed and experiencing difficulties with medical procedures were increased by wanting to do things alone rather than as a part of a team (Individual Environment, OF7-). Both overwhelm and difficulty with medical procedures were shown to be reduced by being motivated to adhere to policies and rules (Assertive Rules, N1).

The role of indifference (N2) in medical student satisfaction with career choice

As stated above, the most satisfied students were indifferent to the rules and policies, deciding themselves how they would act (Indifference, N2; Individual Motives, OF3+). These results were in contrast to the regression results for satisfaction items 5, 8 and 9 where a disregard for the rules and policies (Indifference, N2) positively predicted difficulty with procedures and feeling overwhelmed with the thoughts of becoming a doctor and/or the emotional demands of the role. This seemingly contradictory result may be explained by viewing satisfied students overall as those who exhibit an attitude of self-determination and evaluation of what is important from a personal position.

This could be a beneficial approach to later surviving the potential challenges of the medical role. However, when a specific element of the process of satisfaction was examined (overwhelm) it was found that indifference, in this specific area, was counterproductive to performing the procedures and contributed to feeling overwhelmed.

While this finding alerts educators to potential areas for coaching and monitoring, overall, feeling indifferent to rules was found to be of greater benefit than disadvantage in career choice satisfaction.

Consistency with research findings

(i) Indifference to rules and policies

While early research by Libo (1957) found that the majority of medical students in his study scored low in authoritarianism (or not wanting to follow or assert rules) no other specific studies dealing with the importance of applicants' motivation to follow the rules and procedures associated with clinical medicine were found. The findings of this study present a new awareness of the impact of students' motivations to rules and the impact on their satisfaction with their career choice. It also revealed new perspectives on the relationship between finding medical procedures difficult and feeling overwhelmed.

(ii) Decision making based on individual values and beliefs

An internal frame of reference and making decisions based on one's own values was found to be associated with high career choice satisfaction in the present study and is consistent with a body of research associated with importance of living one's values in regard to medical student and physician career choice satisfaction (Stoddard, Hargraves, Reed & Vratil, 2001). Further, loss of autonomy in physician practice has been demonstrated to be associated with dissatisfaction (Landon, Reschovsky & Blumenthal, 2001; Girard, Choi, Dickey, Dickerson & Bloom, 2006).

(i) Timetabling of clinical placements to encourage greater stability

The present study found that the most satisfied students were likely to be unmotivated by successive and quick clinical placements. This finding reinforces the research of Chalabian & Bremner (1998) who studied the negative impact of program changes on residents' motivation.

Limitations of the research into career choice satisfaction with career choice

The current satisfaction with career choice questionnaire was designed to meet the purposes of this study. At the time of commencing the study, no specific questionnaires that assessed various elements of medical students' satisfaction with their career choice were found. Factor analysis of the satisfaction with the career choice questionnaire revealed a relatively poor factor structure. The development of a valid questionnaire to assess medical students' satisfaction with elements of working as a future doctor is a potential project that has merit.

Research Question 1:(b) iWAM as predictor of academic achievement in the Bachelor of Medicine program

The research demonstrated that the iWAM instrument was able to identify critical Work Motivations that could predict both good and poor outcomes in the Bachelor of Medicine academic program.

Critical Work Motivations for academic achievement

Multiple linear regressions analysing academic achievement and the 48 iWAM Work Motivations revealed four significant Work Motivations which together accounted for 35% of the variance in academic achievement in the medical program. It is notable that all of the significant Work Motivations remained unchanged in the model after seven demographic and environmental variables were introduced which substantiates their predictive potential for academic performance. The critical motivations were Group Environment (OF7+), positively correlated; and Convinced by Consistency (Co7); Convinced by Reading (Co3) and Focus on Tools (IF2), all three negatively correlated. Interestingly, two of the four critical Work Motivations were associated with the process of how students become convinced, one centred on the kind of working environment students preferred and the final pattern indicated where students' primary interest was focused.

The motivational profile of high performing students in the academic program

The results reveal the importance of learning through positive group interaction and employing a range of modalities in the decision-making process. Specifically, the motivational profile of an individual succeeding in the academic program is that of a team player who enjoys working with people (Group Environment, OF7+), rather than an individual who prefers to work alone.

Given that the Newcastle medical program, which utilises a problem-based learning approach focused on small group learning it is not surprising that the motivation to work in a team is contributory to successful outcomes.

How the individual becomes convinced is also important to success. While academically successful students may check information before closing down to a decision, they do not continually or obsessively check or avoid making a decision (Convinced by Consistency, Co7). Further, successful students are convinced by a variety of means, not just by written information that they are presented with (Convinced by Reading, Co3).

This may include what they hear from experts and clients, and what they personally observe, do and learn from experience. Additionally, successful students are not primarily focused on tools and instruments in their working environment (Focus on Tools, IF2).

Consistency with previous research findings

These results reinforce previous research concerning the importance of team work (UK Department of Health, 2004; Powis & Bristow, 1997a). The current study has provided further evidence on the importance of student motivation to work with people as part of a team (Group Environment, OF7+) as a contributory factor to academic success.

Knights & Kennedy (2006) who studied the mental health status of Australian students found that 33% of medical students reported perfectionist and obsessive tendencies and 26% reported very high levels of indecisiveness and conformity. A finding of the current study that continual checking and difficulty in closing down to a decision (Convinced by Consistency, Co7) is associated with poor student outcomes may be an indicator of obsessive mental health issues described by Bore et al. (2008) in medical students.

Research Question 1:

(c) iWAM as predictor of clinical performance in the Bachelor of Medicine program

The iWAM instrument was also able to predict Work Motivations that could predict good and poor clinical performance outcomes in the Bachelor of Medicine program.

Critical Work Motivations for clinical performance

Three critical Work Motivations and the demographic variable gender together accounted for 32% of the variance in clinical performance in the medical program. The Work Motivations comprising the regression model focused on how a student deals with rules, how they are convinced, where they focused their time in the clinical context and whether they are male or female.

The critical Work Motivations included focusing on the present (TP2), obsessively checking information (Co7) and indifference (N2). Interestingly, all these Work Motivations were negatively correlated with clinical success in the medical program.

Additionally, seven significant correlations between the 48 iWAM Work Motivations and clinical performance scores included three convincer strategies indicating that how a clinician was convinced and arrived at decisions was important to their success in the clinical arena. Results showed that both obsessive checking of information (Co7) and needing to actually do something oneself to be convinced (Co4) were associated with poor clinical outcomes. Paradoxically, being convinced by reading results, reports and information (Convinced by Reading, Co3) provided the best input channel for making decisions in the clinical context. This was in contrast to the findings for academic performance where being convinced by reading (Co3) was a negative correlate.

Further correlates included focusing on what was learned in the past and the tradition of medicine (TP1) rather than being fully focused on present demands (TP2), not being rule bound (N1) and not being focussed on the tools and equipment (IF2).

Motivational profile of students with high performing students in the clinical program

The profile for clinical performance describes what successful clinicians avoid, including how they deal with rules, make decisions and where they focus their attention and interest.

(i) Decision making

The results show that medical students who receive high scores in the clinical area predominantly rely on written reports and test information in their decision-making process (Convinced by Reading, Co3), they are confident in their decisions and do not waste energy going over and over a decision (Convinced by Consistency, Co7).

(ii) Dealing with rules

Students' motivation for dealing with rules was found to be predictive of outcomes in the area of clinical performance as in the area of student satisfaction with their career choice. While indifference to rules (N2) may help students to cope and remain satisfied during the program, it was found to be a negative predictor of clinical performance. This may be related to the central role played by following rules and procedures in the clinical context and because clinical supervisors may assign lower grades to students who disregard these rules. The results demonstrated that successful clinicians are neither bound by rules (Assertive Rules, N1, correlations) nor indifferent to rules (Indifference, N2), demonstrating a more flexible position.

(iii) Focus of attention

Successful medical students focus on what they have learned in the past (Past, TP1, correlations) rather than being overwhelmed by immediate demands (Present, TP2). They also avoid being overly focused on the instruments and equipment they use as part of medical procedures (Focus on Tools, IF2).

Consistency with previous research findings

The current study has identified temporal awareness (or where a student's attention is focused in time) as a significant issue related to clinical outcomes. This area has not been the subject of previous research, with the current study offering new insights into personal attributes that may imperceptibly influence clinical performance.

The current research has also highlighted specific convincer channels that are critical to sound clinical decision making. No earlier research describing the means by which medical students become convinced as the prelude to decision making has been located. As noted earlier, the process of constant or obsessive checking (Co7) which was found to be a critical negative predictor of clinical as well as academic performance, reinforces the findings of Knights & Kennedy (2006) and work of Bore et al. (2008) in noting the prevalence of mental health issues in medical students.

Research Question 2: Adding demographic variables to the models for satisfaction with career choice, academic achievement and clinical performance

To assess if additional factors might help explain the variance of the three outcome variables, the regression models for career choice satisfaction, academic and clinical performance were re-run adding a range of demographic variables that may influence student performance. These included whether students worked outside the program,

the number of study hours, age, gender, whether students were living away from home for the first time that year and their country of origin.

Career choice satisfaction and academic achievement models

For both satisfaction with career choice and academic achievement models, none of the demographics resulted in the replacement of any of the critical Work Motivations and the final models remained unchanged.

Clinical performance model

However, when the seven demographic variables were added to the model for clinical performance a new model, which increased the variance explained from 25% to 32%, included the three existing Work Motivations and the demographic variable gender. The new model revealed that clinical performance scores were on average six points higher for males than females (Cohen's $d = 0.51$). By Cohen's criteria this represents a medium effect size in this study.

Previous research

The results of the current study regarding gender differences in clinical performance ratings reinforce the findings of a number of recent researchers who have investigated gender and medical student outcomes. These include Tore et al. (2005) who found that female medical students perceived that their clinical skills were lower than their male peers. Further, Hojat et al. (2002) found that female medical students had higher scores in both general and test anxiety than male students. Further, Polish researchers Pawelczyk et al. (2007) demonstrated that medical students' gender was significantly correlated with self-concept and aspirations, while Meit et al. (2007) found significant personality differences between female and male medical students within 11 of the 16PF personality factors.

Limitations

The demographic question 'do you work part time, if so, how many hours?' was answered by only 53% of participants. This loss of data may have influenced the demographic influence of working outside the program on student performance. This is acknowledged as a limitation to the final models for academic and clinical performance and to career choice satisfaction.

Research Question 3:

Change of Work Motivations over time during five-year program

To determine if a ‘training in’ effect occurred during the five-year Bachelor of Medicine the critical Work Motivations were analysed using ANOVA, then the Tukey multiple comparison method, to determine if there were statistically significant changes between the mean scores for the Work Motivations for Years 1 to 5. Only four of the 48 Work Motivations revealed significant changes during the five-year program indicating that the means of the majority of the iWAM Work Motivations remained at relatively constant levels during the medical training period.

Work Motivations that were subject to a ‘training in’ effect or context changes

The four Work Motivations that demonstrated significant shifts throughout the medical program included Convinced by Consistency (Co7, academic achievement and clinical performance), Indifference (N2, career choice satisfaction and clinical performance), Present (TP2, clinical performance) and Convinced by Reading (Co3, academic achievement). Each of these Work Motivations followed a similar trend of rising to a peak (or falling to a trough) in Year 3, with this year demonstrating significantly different results to all other years, except Year 5.

The significant change in mean Work Motivation scores for Year 3 and 5 indicated a difference in motivations for these years, most likely due to changing contexts. For example, during Years 1 and 2 students are closely supervised in clinical placements, while Year 3 represents a more significant and consistent exposure to a number of short (week long) clinical placements in regional areas. In Year 4, clinical rotations span longer periods where students may feel a higher level of stability with time to build competency in the clinical area. During Year 5, once again students experience short rotations, with a higher expectancy of competent performance.

Rapid changes were found to be negatively associated with career choice satisfaction in medical students (Difference, So3; critical Work Motivation, total scores for satisfaction). Further, the significant changes in the mean scores for the critical Work Motivations were found to occur in the years where there were rapid changes in clinical placements (Year 3 and Year 5). A possible explanation may be that the shorter and more frequent placements reduce students’ capacity to gain competence in an area and may lead to an adjusted set of attitudes or coping strategies to support them in these environments.

Work Motivations that were not responsive to training in effect or context changes

The critical Work Motivations that did not shift throughout the program explained performance differentials for satisfaction with career choice and academic performance variables (but not the clinical performance variable). These Work Motivations did not undergo a 'training in' effect, indicating that they were probably innate to the individual medical students. These issues are discussed below under the three outcome variables for the study.

(i) Stable Work Motivations in students' satisfaction with their career choice

Critical Work Motivations that did not exhibit significant change throughout the program were an effective communication style that focuses on non-verbal and expressive communication (BP6), deciding from within one's own standards and values (OF3+); compliance to rules and policies (N3) and not wanting rapid or frequent change (So3). It is suggested that these Work Motivations are all ways of thinking fundamental to career choice satisfaction in the medical program.

(ii) Stable Work Motivations in students' academic performance

Critical Work Motivations for academic performance that remained stable through the medical program were a preference for working in a team (BP7) and a negative focus on tools and equipment (IF2).

(iii) Work Motivations and students' clinical performance

The clinical environment represents an area of changing contexts. All three critical Work Motivations for the clinical area demonstrated a rising and falling trend, possibly responsive to the changes in context and/or a 'training in' effect. These Work Motivations were Indifference (N2); Present (TP2) and Convinced by Consistency (Co7).

Comments on the reliability of the Indifference (N2) Work Motivation

Indifference (N2) has emerged as a significant predictor of academic and clinical performance in the medical student sample. Further, in the applicant sample Indifference (N2) was one of the three Work Motivations that differentiated the worked and non-worked groups. Given the highly significant beta scores for the Indifference Work Motivation in predicting career choice satisfaction (beta= 0.67) and clinical

performance (beta= -0.32) in the medical program the regressions were recalculated, and produced the same result.

Research into the robustness of the Indifference (N2) measure, revealed that N2 was one of the lowest scoring Work Motivations for reliability in the test re-test iWAM study (USA, 2007). As noted in Chapter 2, the overall reliability of the test re-test scores for the 48 Work Motivation patterns revealed a shift of only 2% between the tests and that all patterns (including the Indifference Work Motivation) were within 5% in the re-test study.

Further, the Indifference Work Motivation was found to be the only pattern that contained negatively framed statements in the 40 question iWAM questionnaire. This difference in question design may contribute to the lowered reliability of this measure.

Overall, further investigation of the robustness of the Indifference (N2) measure is indicated, given the consistency with which it has appeared in this research and the indication that test design of the iWAM questionnaire may be influencing test applicants' perception of the measure.

Limitations

Overall, the numbers for the medical sample were lower than calculated to give optimal power to the study. This included lower numbers in the final years of the program, which reduces the generalisability of the results in this area of the study.

Summary of medical student study results

The iWAM instrument has been shown to be a reliable instrument for the identification of critical Work Motivations of medical students, and has predictive validity. Work Motivations have been shown to play an important role in the academic and clinical performance of medical students as well as predict their satisfaction with career choice.

Sample size and the generalisability of results

There was an overall low response rate for the study. There may be many contributors to this result. A general, less than positive attitude to personal qualities testing in medical students prevailed amongst the student body. This was evidenced during the face to face research presentations delivered to the students during their combined lectures. Additionally, at the time of data collection for the study, the University was experiencing a financial crisis which was fuelled by media publicity -

which predicted the possible closure of the medical school. This publicity resulted in the Dean of Medicine requesting that the data collection for the study be delayed for five months, due to general level of distress among the medical students. Finally, the medical students in the medical program were approached to participate in numerous research studies on a weekly basis, within a demanding time schedule.

Given the restraints upon attracting the ideal sample size, the final number of 116 participants was seen to represent a viable sample for this type of study. The sample represented approximately 20% of the student body and the research team was satisfied that all possible attempts to increase the sample size had been utilised. Given that the medical sample did not reach the numbers calculated to provide sufficient power to the study, caution must be exercised in the generalisability of the results.

6

Recommendations from study findings

This study has trialled a Work Motivations instrument (iWAM) which has been found to be reliable in measuring Work Motivations in applicants to and students in medical schools. In response to those who suggest the need for validated tests on motivation (e.g. McManus et al., 2005), this study has identified clusters of critical Work Motivations which impact upon medical students' academic, clinical and career choice satisfaction.

A number of authors have reinforced the need for admissions committees to prioritise specific forms of motivation testing in the selection process (Robbins et al., 2004; McManus et al., 2005; Munro et al., 2008). Currently, applicants' motivation, if measured at all, is assessed subjectively during selection interviews which are part of the selection procedure of many medical schools within Australia and around the world. The current study has demonstrated that a more targeted testing of specific motivations shown to be associated with good and poor outcomes in the medical program may complement current medical selection procedures.

Besides recommendations relating to student selection there follow some specific suggestions for educators in coaching students in the critical motivations that impact upon student outcomes.

Recommendations for medical student selection

There were critical Work Motivations that were found to be predictive of academic and clinical success and satisfaction with career choice which did not respond to a 'training in' effect during the medical program (i.e. innate qualities). Accordingly, it is suggested that these attributes should be identified and assessed during the medical student selection procedure. These critical Work Motivations include:

- (i) The motivation to learn and work as part of a team

The current study has established the critical importance of being motivated to work as part of a team to good performance in the academic performance in the medical program.

The study also demonstrated that this motivation is unlikely to be developed during the medical program. To ensure medical students possess the innate desire to work as part of a team it requires accurate identification during the medical selection procedure. While potential for teamwork is often subjectively assessed during the medical selection interviews throughout Australia, a quantitative measure of applicants' motivation to working with people and as part of a team, may offer more reliable input into this significant area of fit to the medical program.

(ii) Expressive and affective communication style

Openness to communicate affectively and to pay attention to the non-verbal aspects of the communication process was found to be critical to student satisfaction in the current study. This motivation also was found to be relatively stable in students during the five-year program and therefore apparently not amenable to development by medical education. Two studies cite the importance of open communication to effective doctor-patient relationships (Murden, Galloway, Reid & Colwill, 1979; Reed, Jernstedt & McCormick, 2004). The quantitative measurement of applicants' natural preferences in communication style may also offer a useful adjunct to the selection process.

(iii) Assessing productive and unproductive decision-making processes in applicants

While it has been established that a 'training in' effect and context changes both may influence a student's decision-making strategy, the natural preference for consistent checking and difficulty closing down to a decision (Co7) may be seen as an indicator of obsessive tendencies. This preference would be effectively screened by the iWAM instrument and act as the basis for later targeted questioning during a selection interview. Questions of this type may sit congruently within the area of 'tolerance of ambiguity/uncertainty' testing, during an interview process.

(iv) Attitudes to rules

This is not currently an area of focus in medical selection interviews at the University of Newcastle, NSW. However, this study has demonstrated the significant influence of a students' rule structure upon the effective performance medical procedures, potential for feeling overwhelmed with the doctor's role, clinical performance grades and satisfaction with career choice. Therefore, the measurement of students' motivation to adhere to rules, especially when they may be in conflict with students' beliefs or values, may be a fertile area to explore in medical selection interview processes and may offer valuable information for the applicants' future performance and satisfaction in the medical program. The iWAM instrument is able to

quantitatively identify applicants' rule structure, highlighting students most likely approach to dealing with policies and rules.

Recommendations for medical educators

While it has been demonstrated that the critical Work Motivations discussed above are unlikely to respond to medical training, it may be helpful for educators to be aware of the ways of thinking that impact upon success in the medical program as they interact with and support students.

Facilitating academic success in medical students

As the motivation to work with people in a team was a moderate predictor of academic success, explicitly encouraging students in group dynamics and positive group interaction may facilitate students' academic performance. This may involve working with students who are less motivated to be part of a group, reminding them of the benefits of learning in a group environment and coaching them in more effective interactional skills where needed.

The importance of explicitly teaching effective and ineffective decision-making processes to students is a significant finding arising from the current study. The results indicate that exposing students to a number of input channels for acquiring information and coming to a decision may help to facilitate student learning. As the impact of different input modes (e.g. hearing, feeling, seeing, reasoning, reading or doing) naturally vary between individuals, it is important to not over rely on written information and reports to the exclusion of other important input channels in the learning process.

Encouraging clinical success in the medical program

As with the academic and career choice satisfaction areas, educators may facilitate clinical success by monitoring and working with students' attitude and compliance to rules and policies. Educators may also assist students by helping them to become conscious of how they are making decisions and the weight they are ascribing to different input channels as part of this process (reading, hearing, seeing, and doing).

The negative impact of being fixated on what is happening in the present (TP2) may imply that students are focused on immediate demands rather than on what is important or what has been learned in the past. Explicit coaching on how to cope with multiple and present demands, may include simulations where the actual thinking and

steps in decision making and the thoughts that lead to unhelpful stress or positive action can be explored and positive approaches practised.

In dealing with present demands the career choice satisfaction results (correlations, career choice satisfaction question 5) demonstrated that clinical overwhelm was negatively correlated with reflecting before making a decision and taking time to make a decision (Reflection and Patience, OF2-; Convinced over a Period of Time, Co8). Therefore, coaching medical students in how to slow down and ground their thinking, may help to reduce a sense of overwhelm. It should be noted that taking time to make a decision (Co8) is not the same as obsessive checking or consistently going over and over a decision (Convinced by Consistency, Co7).

Working with students' complaints

While students may often complain that hospital policies are sometimes inconsistent or unhelpful, supervisors should note that many medical students have sufficient internal frame of reference to act in tandem with their complaints and may be covertly non-compliant. It may also result in dropping motivation and dissatisfaction for these students. These complaints should then be taken seriously and educators may coach students to view these rules in the context of the bigger picture. Students' agreement with their supervisors on their subsequent approach to these rules may help to avert future covert action.

Clinical skills

Tore et al. (2005) recommend that medical schools invest much more effort in clinical skills training, especially with female students. The current study reinforces these conclusions. As female students may experience higher anxiety levels than males (Hojat et al., 2002), supervisors may assess students' coping mechanisms and monitor for the three thinking styles found to be negative predictors of clinical performance in the current study (overwhelmed by present demands, indifference to rules and policies and constant or obsessive checking/poor decision making).

What can lecturers do to encourage satisfaction in medical students?

(i) Values work with students

As students ultimately initiate actions based on their own values and interpretations, significant work with understanding, eliciting and clarifying values and

their consequent actions would be fundamental to increasing students' awareness of their decision-making processes.

(ii) Timetabling of clinical placements

Given that the critical Work Motivations for total satisfaction revealed that the most satisfied students were not motivated by rapid change (Difference, So3), timetabling clinical placements so that Year 3 and Year 5 experience a decreased frequency of quick changes between placements may increase stability and career choice satisfaction of students in these years

(iii) Procedural difficulty and overwhelm

As noted above, feeling overwhelmed and finding difficulty with medical procedures were strongly associated with each other. Therefore, students demonstrating poor competencies in performing medical procedures may be experiencing overwhelm and the source of this problem may be the students' attitude to the rules (Indifference, N2), wanting sole responsibility (Sole responsibility, OF8+) and/or remembering past failures (TP1, Past). Therefore, working with students to build competencies with medical procedures may not address the underlying motivational issues.

Supervisors could assist students by helping them to see how their current (and possibly challenging) experience is contributing to their overall professional development. The sense of overwhelm may also be ameliorated as students are encouraged to re-focus on meaningful aspects of their work, including the contribution they are making to their patients, the satisfaction of patient and collegial relationships and the supportive framework found in investing in and contributing to the team.

Conclusion

Understanding the Work Motivations that drive the performance of medical students who perform well in academic and clinical streams and experience satisfaction with their career choice provides new information for assessing personal attributes in medical school applicants. These motivations may help to facilitate the identification of a closer person-job fit between medical students and the demands of becoming a competent and humane doctor.

References

Abdel-Halim, A. (1981) Effects of role stress–job design technology interaction on employee work satisfaction, Academy of Management Journal, 34, 260-273

Adams O'Connell, V. & Gupta, J. (2006) The premedical student: Training and practice expectations, Medical Education Online 11,12

Adyemo, D. (1997) Relative influence of gender and working experience on job satisfaction of primary school teachers, The Primary School Educators, 1, 1, 86-89

Ajila, C. (1997) Maslow's hierarchy of needs theory: applicability to the Nigerian industrial Setting, IFE Psychology, 5,162-74

Albanese, M., Snow, M., Skochelak, S., Huggett, K. & Farrell, P. (2003) Assessing personal qualities in medical school admissions, Academic Medicine, 78, 3, 1

Alexander, J., Lichtenstein, R. & Hellmann, E. (1998) A causal model of voluntary turnover among nursing personnel in psychiatric setting, Research in Nursing and Health, 21, 5, 415-427

Ambrose M. & Kulik, C. (1999) Old friends, new faces: motivation research in the 1990s, Journal of Management, 25, 3, 231-92

Austin, J., Evans, P., Goldwater, R. & Potter, V. (2005) A preliminary study of emotional intelligence, empathy and exam performance in first-year medical students, Personality and Individual Differences, 39, 1395-1405

- Bales, R. (1950) Interaction Process Analysis: A Method for the Study of Small Groups. Addison-Wesley Publishing, Massachussets, USA.
- Balogun, J. (1988) Predictors of academic and clinical performance in a baccalaureate physical therapy program, Physical Therapy, 68 , 2, 238- 242.
- Bandler,R.,Gordon, D. & Lebeau, M. (1985) The imprint method, a guide to reproducing competence, Future Pace Books, California, USA
- Bandura. A.(1977) Self-efficacy: Toward a unifying theory of behavioural change. Psychological Review, 84, 191-215
- Bandura, A. (1994) Self-efficacy. In V. S. Ramachaudran (Ed.), Encyclopedia of human behaviour , 4, 71-81. New York: Academic Press
- Barnsley, L., Cameron, R., Engel, C., Feletti, G., Hazell, P., McPherson, J., Murphy, L., Pearson, S., Powis, D., Rolfe, I., Smith, A., Saunders, N. & Wallis, B. (1994) Ratings of performance of graduates from traditional and non-traditional medical schools, Teaching and Learning in Medicine, 6, 179-184
- Barrick, M, Mount, M. & Judge, T. (2001) Personality and performance at the beginning of the new millennium: what do we know and where do we go next? Personality and Performance, 9, 9-40
- Barzansky, B., Friedman, C. & Arnold, L. (1993) A view of medical practice in 2020 and its implications for medical school admission, Academic Medicine, 68, 31-34
- Best, J. (1989) The politics of the sand-pit, Medical Journal of Australia, 150, 158-161

Benzies- Levine, S. & Knecht, H. & Eisen, R. (1986) Selection of physical therapy students: interview methods and academic predictors, Journal of Allied Health, May, 143-151.

Berne, E. (1964) Games People Play, Grove Press, New York, USA

Block, J. (1995) A contrarian view of the five factor approach to personality description, Psychological Bulletin, 117, 187-215

BNET dictionary: <http://dictionary.bnet.com/definition/Motivation.html>

Boey, K.W. (1999) Distressed and stress resistant nurses, Issues in Mental Health Nursing, 20, (1), 33-54

Bore, M., Ashley-Brown, G., Gallagher, E., & Powis, D. (2008) Personality and the prevalence of psychiatric symptoms in medicine and psychology students. In Personality Down Under: Perspectives from Australia, Chapter 15, Nova Science Publishers Inc, NY, USA.

Brett J. & VandeWalle, D. (1999) Goal orientation and goal content as predictors of performance in a training program, Journal of Applied Psychology, 84, 863-73

Briggs Myers, I., McCauley, M., Quenk, N. & Hammer, A. (1999) A Guide to the Development and Use of the Myers-Briggs Type Indicator, Third Edition, Consulting Psychologists Press, Melbourne, Victoria

British Medical Association, Health Policy & Economic Research Unit (2002) BMA Cohort Study of Medical Graduates, Seventh Report, British Medical Association, London, UK.

Brown, J. & Sheppard, B. (1997) Teacher librarians in learning organisations: Paper presented at the Annual Conference for International Association of School Librarianship, Canada

Burton N. & Ramist, L. (2001) Predicting success in college, SAT studies of classes graduating since 1980, The College Board Research Report, 2001-2002, New York, College Entrance Examination Board

Caldwell, D. & O'Reilly, R. (1999) Measuring Person-Job Fit With a Profile-Comparison Process, Journal of Applied Psychology, 75, (6), 648-656

Chalabian, J. & Bremner, R. (1998) The effects of programmatic change on resident motivation, Surgery, 123, (5), 511-7.

Charvet, S. (1995) Words that change minds: mastering the language influence, Debuque 1A, Kendall Hunt Publishing Canada

Chess, W., Vinokur-Kaplan, D. & Jayaratne, S. (1994) Job satisfaction and retention of social workers in public agencies, non-profit agencies, and private practice, Administration in social work , 18, (3), 93-121

Choo, F. (1986) Job stress, job performance and auditor personality characteristics, Auditing: A Journal of Practice and Theory, 5, (2), 17-34

Coebergh, J. (2003) Dutch medical schools abandon selection for lottery systems for places, British Medical Journal, 11, 138

Conger, J. & Fitz, R. (1963) Prediction of success in medical school, Journal of Medical Education, 38, 943-948

Crewson, P. (2009) Public service motivation; Building empirical evidence of incidence and effects, Journal of Public Administration Research and Theory, 7 , 4, 499-518

Deci, E. & Ryan, M. (2000) Motivation: Intrinsic and Extrinsic, Contemporary Educational Psychology, 25, 54-67

Department of Health (2004) Medical schools: Delivering doctors of the future, Department of Health Publications, London

Di Cesare, J. & Sadri, G. (2003) Do all carrots look the same? Examining the impact of culture on employee motivation, Management Research News, 26, 1, 29.

Dickman, R., Sarnacki, R. & Schimphauser, F. (1980) Medical students from natural science and non science backgrounds; similar academic performance and residency selection, Journal of the American Medical Association, 243, 2506-2509

Digman, J. & Takemoto- Chock, N. (1981) Factors in the natural language of personality: Re-analysis, comparison and interpretation of six major studies, Multivariate Behavioural Research, 16, 149-170

Dilts,R. (1990) Changing belief systems with NLP. Meta Publications, California, USA

Dilts, R., Grinder, J., Bandler, R. & DeLozier, J. (1980) Neuro-Linguistic Programming; The Study of the Structure of Subjective Experience, Meta Publications, Capitola, California, USA

Edwards, J., Johnson, E. & Molidor, J. (1990) The interview in the admission process, Academic Medicine, March, 167-175.

Eliason, B. & Schubot, D. (1995) Personal values of exemplary family physicians: Implications for professional satisfaction in family medicine, Journal of Family Practice, 41, 251-256.

Ellis, B. & Miller, K.(1993) the role of assertiveness, personal control and participation in the prediction of nurses burnout, Journal of Applied Communication Research, 21, 327- 358.

Engel, G. & Arthur, J. (2000) The Motivation Profile Guidebook, Lifestar Books, Denver, USA

Enns, M., Cox, B., Jitender, S. & Freeman, P. (2001) Adaptive and maladaptive perfectionism in medical students: a longitudinal investigation, Medical Education, 35, 1034-1042.

Enright, M. & Gitomer, D. (1989) Toward a Description of Successful Graduate Students, Princeton, NJ, Educational Testing Service

Erez, M. & Judge, T. (2001) Relationship of core self-evaluations to goal setting, motivation and performance, Journal of Applied Psychology, 86,1270-79

Erez, A. & Isen, A. (2002) The influence of positive affect on components of expectancy motivation, Journal of Applied Psychology, 87,1055-67

Eva, K., Reiter, H., Trinh , K., Wasi, P., Rosenfeld , J, Norman (2009) Predictive validity of the multiple mini-interview for selecting medical trainees. Accepted for publication January 2009 in Medical Education.

Eva, K., Reiter, H., Trinh, K., Wasi, P., Rosenfeld, J., Norman (2009) The ability of the multiple mini-interview to predict pre-clerkship performance in medical school, Academic Medicine, 10, 79, S40-42

Eva, K., Reiter H., Rosenfeld J. & Norman, G. (2004 b) The relationship between interviewer characteristics and ratings assigned during a Multiple Mini-Interview, Academic Medicine, 79, 6, 602- 609.

Ferguson, E., James, D. & Madeley, L. (2002) Factors associated with success in medical school: systematic review of the literature, British Medical Journal, 324, 20 April, 2002

Furnow, L. (2002) Selecting nurses based on behavioural characteristics, Association of Operating Room Nurses, AORN Journal, 3, 23-27

Gabard, D., Porozio, R. & Braun, R (1997) Admission interviews: questions of utility and cost in Masters of Physical Therapy programs in the United States, Physiotherapy Research International, 2, 3, 13- 149.

Gardner, R. & Long, R. (1962) Cognitive controls of attention and inhibition: a study of individual consistencies. British Journal of Psychology, 53, 381-88.

Girard, D., Choi, D., Dickey, J., Dickerson, D. & Bloom, J. (2006) A comparison study of career satisfaction and emotional states between primary care and specialty residents, Medical Education, 40, 1, 79-86.

Green, T. (2000) Keeping the faith in motivation, Incentive, 174, 8, 81-82

Greenberg, J. & Baron, R. (1997) Behaviour in Organisations: Understanding and Managing the Human Side of Work, Prentice- Hall, New Jersey.

Griffin, B., Harding, D. & Yeomans, N. (2008) Does practice make perfect? The effect of coaching and retesting on selection tests used for admission to an Australian medical school, Medical Journal Australia, 189, 5, 270-273.

Gordon, J. (2003). Fostering students' personal and professional development in medicine: A new framework for PPD. Medical Education, 37, 341-349.

Gough, H. & Hall, W. (1975) Admission procedures as forecasters of performance in medical training, Journal of Medical Education, 38, 983-998

Gough, H. (1985) A work orientation scale for the California personality inventory, Journal of Applied Psychology, 70, 505-513

Greenwald, R. & Wiener, S. (1976) A standardised interviewing technique for evaluating postgraduate training applicants, Journal of Medical Education, 51, 912-918.

Groves, M.A., Gordon, J., & Ryan, G. (2007) Entry tests for graduate medical programs: is it time to re-think? Medical Journal of Australia, 186, 120-123

Hall, M. & Bodenhamer, B. (1997) Figuring out people, design engineering with metaprograms. Crown House Publishing, Wales, UK

Harasym, P., Woloschuk, W., Mandin, H. & Brundin-Mather, R. (1996) Reliability and validity of interviewers' judgements of medical school candidates, Academic Medicine (Supplement), 71, 1, 40-42.

- Harding, R. (1999) Child Branch: Criteria for Selection, Pediatric Nursing, 12, 46-49
- Hart, A. (1986) Operating room nurses personality profiles as related to job satisfaction, PhD dissertation, Indiana University School of Nursing, Indianapolis
- Herzberg, F., Mausner, B. & Snyderman, B. (1959) The Motivation to Work, John Wiley & Sons, N.Y.
- Hobfall, S. & Benor, D. (1981) Prediction of student clinical performance, Medical Education, 15, 231-236
- Hofmeister, M., Lockyer, J. & Crutcher, R. (2009) The multiple mini interview for selection of medical graduates in family medicine residency education, Medical Education, 43, 6, 573-579.
- Hogan, R. (2005) In defence of personality measurement: New whine for old whiners, Human Performance, 18, 4, 331-341
- Hojat, M., Gonnella, J.S., Mangione, S., Nasca, T.J., Veloski, J.J., Erdmann, J.B., Callahan, C.A. & Magee, M (2002) Empathy in medical students as related to academic performance, clinical competence and gender, Medical Education 36, 522-527
- Holland J. (1997) Making vocational choices: A theory of vocational personalities and work environments (3rd edition), Psychological Assessment Resources, Odessa, Florida.
- Hough, L., Eaton, N., Dunnette, M.,Kamp, J. & McCloy, R. (1991) Criterion-related validities of personality constructs and the effects of response distortion on those validities, Journal of Applied Psychology, 75, 581-585

Howell, M. & Vincent, J. (1967) The medical college admission test as related to achievement tests in medicine and to supervisory evaluation of clinical physicians, Journal of Medical Education, 42, 1037-1044

Hunter, J. Schmidt, F. & Jackson, G. (1982) Meta analysis: Cumulating research findings across studies, Sage Publishing, California

Hunter, J. & Hunter, R (1984) Validity and utility of alternate predictors of job performance, Psychological Bulletin, 96, 72-98

Jacobson, S. (1996) Solution states. A course in solving problems in business with the power of NLP, Anglo American Book Company, Wales, UK

James, D. & Chilvers, C. (2001) Academic and non-academic predictors of success on the Nottingham undergraduate medical course 1970-1995, Medical Education, 35, 1056-64

James, T. & Woodsmall, W. (1998) Timeline therapy and the basis of personality. Meta Publications, California, USA

Judge, T., Locke, E. & Durham, C. (1997) The dispositional causes of job satisfaction: a core self-evaluation approach, Research into Organisational Behaviour, 19, 151-88

Judge, T., Heller, D. & Mount, M., (2002) Five factor model of personality and job satisfaction: a meta analysis, Journal of Applied Psychology, 87, 3, 530-54

Judge, T. & Ilies, R. (2002) Relationship of personality to performance motivation: a meta-analytic review, Journal of Applied Psychology, 87, 797-807.

Jung, C. (1928) *Contributions to Analytical Psychology*, Routledge & Keagen Paul, London, UK.

Kagan, J. & Moss, H. (1962) *Birth to maturity: a study in psychological development*, Wiley Books, New York, USA

Kahneman, D. & Tversky, A. (1992) *Advances in prospect theory: Cumulative representation of uncertainty*, Journal of Risk and Uncertainty, 4, 23-25.

Kamalanabhan, T., Uma, J. & Vasanthi, M. (1999) *A study of motivational profile of scientists in research and development organizations*, Psychology Reports, 85, 743-49

Kamali, S., Khan, B., Khan, M. & Khan, A. (2007) *Motivation and its impact on performance*, Unpublished paper, Department of Business Administration. Gomal University, Pakistan

Kanfer, R. (1991) *Motivation theory and industrial and organizational psychology*. In Handbook of Industrial and Organizational Psychology. Ed. Dunnette, M. & Hough, L., 75–170, Palo Alto, CA

Keck, J., Arnold, L., Willoughby, L. & Calkins, V. (1979) *Efficacy of cognitive/non cognitive measures in predicting resident - physician performance*, Journal of Medical Education, 54, 759-765

Killip, D. Fuller, J. & Kerber, P. (1979) *The admission interview: the validity question*, Journal of Dental Education, 43, 10, 547- 551.

Kluckhohn & Strodtbeck *Values orientation theory* (1961): In Lonner, W., Dinnel, S., Hayes, D. & Sattler, D.(Eds.), Online Readings in Psychology and Culture (Unit 3, Chapter 6), Centre for Cross-Cultural Research, Washington USA.

Knights, J. & Kennedy, B. (2006) Medical school selection: screening for dysfunctional tendencies, Medical Education, 40, 11, 1058-1064

Konig, C., Melchers, K., Kleinman, M., Richter, G. & Klehe, U. (2007) Candidate's ability to identify criteria in non transparent selection procedures: Evidence from an assessment centre and a structured interview, International Journal of Selection and Assessment, 15, 283-292

Kretiner, R. & Kinicki, A. (1998) Organisational Behaviour (4th ed.), McGraw Hill, Boston

Kumana, C. (2006) Medical professionalism in a changing SAR, Hong Kong Med Journal, 12, (3), 172-173

Kuncel, N., Hezlett, S. & Ones, D. (2001) A comprehensive meta analysis of the predictive validity of the graduate record examinations: Implications for graduate student selection and performance, Psychological Bulletin, 127, 162-181

Kyllonen, P.C., Walters, A.M. & Kaufman, J.C. (2005) Non-cognitive constructs and their assessment in graduate education: A review. Educational Assessment, 10, 153-154

Landon, B., Reschovsky, J. & Blumenthal, D. (2001) Changes in career satisfaction among primary care and specialists physicians, Journal of the American Medical Association, 289, 442-449

Latham, G. & Pinder, C. (2005) Work motivation theory and research at the dawn of the twenty first century, Annual Review Psychology, 56, 485-516

Lawler, E. (1973) Motivation in work organizations, Brookes-Cole, California, 61-88

- Lazarus, J. & van Niekerk, J. (1986) Selecting medical students: a rational approach, Medical Teacher, 8 , 4, 343- 357.
- Leach, F. & Westbrook, J. (2000) Motivation and job satisfaction in one government research and development environment, Engineering Management Journal, 12, 1-4
- Lee, T., Locke, E. & Phan, S. (1997) Explaining the assigned goal-incentive interaction: the role of self-efficacy and personal goals, Journal of Management, 23, 541–59
- Lievens, F., Coetsier, P., De Fruyt, F. & De Maeseneer, J. (2002) Medical students' personality characteristics and academic performance: a five-factor model perspective, Medical Education, 36,(11), 1050-6
- Lilly, J. (1967) Programming and metaprogramming in the human biocomputer. Communication Research Institute Scientific Report Number CR10167, Columbia University, USA.
- Locke, E. & Henne, D. (1986) Work motivation theories. In International Review of Industrial and Organizational Psychology, Ed.. Cooper, C. & Robertson, I.,1-36. New York: Wiley
- Locke, E. & Latham, G. (2004) What should we do about motivation theory? Six recommendations for the twenty first century, Academy of Management Review, 29, 3, 388-403
- Loevinger, J. (1957) Objective tests as instruments of psychological theory, Psychological Reports, Monograph Supplement No. 9.
- Lumsden, M., Bore, M., Millar, K., Jack, R. & Powis, D. (2005) Assessment of personal qualities in relation to admission to medical school, Medical Education, 39, 3, 258-265

Magnus, K., Diener, E., Fujita, F. & Pavot, W. (1993) Extraversion and neuroticism as predictors of objective life events: A longitudinal analysis, Journal of Personality and Social Psychology, 65, 1046-1053.

Malouff, J., Thorsteinsson, E. & Schutte, N. (2005) The relationship between the five-factor model of personality and symptoms of clinical disorders: A meta-analysis, Journal of Psychopathology and Behavioural Assessment, 27, 101-114

Mann, W. (1979) Interviewer scoring differences in students' selection interviews, American Journal of Occupational Therapy, 33, 4, 235-239.

Markert, R. & Shores, J. (1981) Assessing fairness in the medical school admission interview, College and University, Winter, 160-166.

Mathieu, J. & Zajac, D. (1990) A review and meta analysis of the antecedents, correlates and consequences of organisational commitment, Psychological Bulletin, 8, 2, 171-194

McClelland, D. (1961) The Achieving Society: Van Nostrand Co., Princeton, New Jersey

McClelland, D. & Boyatzis, R. (1982) Leadership motive pattern and long term success in management, Journal of Applied Psychology, 67, 6, 737-743

McCrae, R. & Costa, P. (1989) The structure of interpersonal traits, Wiggin's circumplex and the five factor model, Journal of Personality and Social Psychology, 56, 586-595

McManus, I., Powis, D., Wakeford, R., Ferguson, E., James, D. & Richards, P. (2005) Intellectual aptitude tests and A levels for selecting UK school leaver entrants for medical school, British Medical Journal, 331, 555-559

McManus, I. & Richards, P. (1986) Prospective survey of performance of medical students during pre-clinical years, British Medical Journal, 293, 124-127

McManus, I., Smithers, E., Partridge, P., Keeling, A. & Fleming, P. (2003) A levels and intelligence as predictors of medical careers in UK doctors: 20 year prospective study, British Medical Journal (Clinical Research Edition) 327, 139-142

Meit, S., Borges, N. & Early, L. (2007) Personality profiles of incoming male and female medical students: Results from a multi-site 9-year study, Medical Education Online, 12, 7

Merlevede, P. (2001) 7 Steps to Emotional Intelligence, Crown House Publishing, UK

Merlevede, P. & Bailey, R. (2001) iWAM Reference Manual, 2001, jobEQ.com.

Merlevede, P. (2005) Moving Metaprograms beyond Flatland, Unpublished Paper www.jobeq.com

Merlevede, P. (2007) Analysis of Test Re Test Study Results, Unpublished Paper www.jobeq.com

Merrill, J., Camacho, Z., Laux, L. & Lorimer, R. (1994), Predictors of final specialty choice by internal medicine residents, Medical Education, 28, 4, 316 -322

Mitchell, K. (1990) Traditional predictors of performance in medical school, Academic Medicine, 65, 149-58

Mitchell, T. & Daniels, D. (2003) Motivation. Handbook of Psychology, 12: In Industrial Organizational Psychology, eds. Borman, W., Ilgen, D. & Klimoski, R., 225-254. Wiley, New York

- Montague, W. & Odds, F. (1990) Academic selection criteria and subsequent performance, Medical Education, 24, 151-157.
- Moreau K., Reiter H. & Eva, K. (2006) Comparison of Aboriginal and Non-Aboriginal Applicants for Admissions on the Multiple Mini-Interview using Aboriginal and Non-Aboriginal Interviewers, Teaching and Learning in Medicine, 1, 58-61.
- Morris, J. (1999) The value and role of the interview in the student admissions process: a review, Medical Teacher, 21, 5, 473-481.
- Moser, K. (1997) Commitments in organisations, Psychologies, 41, (4), 160-170
- Mount, M. & Barrick, M. (1995) The Big Five personality dimensions: implications for research and practice in human resources management. Research in Personality and Human Resources, 13, 153-200
- Mowday, R., Koberg, C. & Mc Arthur, A. (1984) The psychology of the withdrawal process: A cross validation test of Mobley's intermediate linkages model of turnover in two samples, Academy of Management Journal, 27, 79-94
- Munro, D., Bore, M. & Powis, D. (2005) Personality factors in professional ethical behaviour: Studies of empathy and narcissism, Australian Journal of psychology, 57, 1, 49-60
- Munro, D., Bore, M. & Powis, D. (2008) Personality determinants of success in medical school and beyond: 'Steady, Sane and Nice', In Ed., Simon Boag Personality Down Under: Perspectives from Australia, Chapter 9, Nova Science Publishers Inc., NY, USA.

- Munroe, S. & Luck, M. (2004) Motivation based Selection of Negotiation Partners, AAMA, New York, USA
- Murden, R., Galloway, G., Reid, J. & Colwill, J. (1979) Academic and Personal Predictors of Clinical Success in Medical School, Journal of Medical Education, *53*, 711-718
- Murphy, K., Cronin, B. & Tam, A. (2003) Controversy and consensus regarding the use of cognitive ability testing in organisations, Journal of Applied Psychology, *88*, 660-671
- Murphy, K. & Dzieweczynski, J. (2005) Why don't measures of broad dimensions of personality perform better as predictors of job performance? Human Performance, *18*, 4, 343-357.
- Nayer, M. (1992) Admission criteria for admission to physiotherapy schools: how to choose among many applicants, Physiotherapy Canada, *44*, 3, 41-46.
- Naylor, J., Pritchard, R. & Ilgen, D. (1980) A theory of behaviour in organisations, Academic Press, New York
- Neame, R., Powis, D. & Bristow, T. (1992) Should medical students only be selected from recent school leavers who have studied science? Medical Education, *26*, 433-440
- Nord, W. & Fox, S. (1996) The individual in organizational studies: the great disappearing act? In Handbook of Organization Studies, ed. Clegg, S. & Hardy, C., 148-74, Sage Publishing, Thousand Oaks, CA
- O'Connor, J. & McDermott, I. (1995) Patterns of influence review article, NLP World: The Intellectual Journal on the Practice and Theory of NLP, Orzens, Switzerland

O'Reilly, C. (1977) Person-job fit for individual attitudes and performance, Organisational Behaviour and Human Performance, 18, 36-46

Oshagbemi, T. (2003) Personal correlates of job satisfaction: empirical evidence from U,Universities, International Journal of Social Economics, 30, (12), 1210-1232

Otis, N. & Pelletier, L. (2005) A motivational model of daily hassles, physical symptoms, and future work intentions among police officers, Journal of Applied Social Psychology, 35, 2193–2214.

Pawelczyk , A., Pawelczyk, T. & Bielecki , J. (2007) Determinants of Primary Care Specialty Choice Pol Merkurusz Lek 22, 129:233-238

Parry, J., Mathers, J., Stevens, A., Parsons, A., Lilford, R., Spurgeon, P. & Thomas, H. (2006) Admissions processes for five year medical courses at English schools: review, British Medical Journal, 332, 1005-1009

Parsons, T. (1937) Structure of Social Action, McGraw Hill Publishing, New York, USA

Pinder, C. (1998) Work Motivation in Organizational Behaviour, Prentice Hall, New Jersey

Prince-Gibson, E. & Schwartz, S. (1998) Value priorities and gender, Social Psychology Quarterly, 61, 49-67

Porter, L., Steers, R., Mowday, R. & Boulian, P. (1974) Organisational Commitment, Job Satisfaction and Turnover among Psychiatric technicians, Journal of Applied Psychology, 59, 5, 603-609

- Posthuma, B. & Noh, S. (1990) Interview scores and academic grades as selection criteria for admission to an occupational therapy program, Canadian Journal of Occupational Therapy, 57, 5, 285-291.
- Posthuma, B. & Sommerfreund, J. (1985) Examination of selection criteria for a program in occupational therapy, American Journal of Occupational Therapy, 39, 7, 44- 445.
- Powis, D., Neame, R., Bristow, T. & Murphy, L. (1988) The objective structured interview for medical student selection, British Medical Journal, 296, 765-768
- Powis, D. & Bristow, T. (1997a) Imperatives in Medical Education: The Newcastle Approach, Edited by Richard Henry, Kathy Byrne, Charles Engel
- Powis, D. & Bristow, T. (1997b) Top school marks don't necessarily make top medical students, Medical Journal of Australia, 166, 613
- Powis, D. (2008) Selecting medical students, Medical Journal of Australia, 188, 6, 323-324.
- Quinn, C. (2001) Don't hire anyone without me; A Revolutionary Approach to Interviewing and Hiring the Best, Career Press, New Jersey, USA
- Ranfall, S. (2004) A Review of Employee Motivation theories and their Implications for Employee Retention within Organisations, Journal of American Academy of Business, 2, (1), 52-59.
- Rasch, R. & Harrell, A. (1990) the impact of personality characteristics on the turnover behaviour of accounting professionals, Auditing: A Journal of Theory and Practice, 9, 2, 96-102

Ree, M. & Earles, J. (1992), Intelligence is the best predictor of job performance, Psychological Science, 1, 3, 2-6

Reed, V., Jernstedt, G. & McCormick, T. (2004) A Longitudinal study of determinants of career satisfaction in medical students, Medical Education Online, 9, 11, 1-11.

Reede, J. (1999) Predictors of success in medicine, Clinical Orthopaedic and Related Research, 362, 72-77.

Reiter, H., Eva, K., Rosenfeld, J. & Norman, G. (2007) Multiple Mini-Interview Predicts for Clinical Clerkship Performance, National Licensure Examination Performance, Medical Education, 41, 4, 378-84.

Richer, S., Blanchard, C. & Vallerand, R. (2002) A motivational model of work turnover. Journal of Applied Social Psychology, 32, 2089-2113.

Rhoads, J., Gallemore, J., Gianturco, D. & Osterhout, S. (1974) Motivation, medical school admissions and student performance, Journal of medical Education, 49, 1119-1127

Robbins, S., Allen, J., Casillas, A., Hamme- Peterson C., & Le, H. (2004) Unravelling the differential effects of motivation and skills, social, and self-management measures from traditional predictors of college outcomes, Journal of Educational Psychology, 98, 3, 598–616.

Roberts, G. & Porter, A. (1989) Medical student selection- time for change: discussion paper, Journal of the Royal Society of Medicine, 82, 28- 291.

Rhodes, J., Gallemore, J., Gianturco, D. & Osterhout, S. (1974) Motivation, medical school admissions and student performance, Journal of Medical Education, 49, 119-127

Rolfe, I. & Pearson, S. (1994) Communication skills of interns in New South Wales, Medical Journal of Australia, 161, 667-670

Robert, G. & Porter, A. (1989) Medical student selection-time for change: Discussion paper, Journal of Research in Social Medicine, 82, 288-291

Ryan, R. & Deci, E.(2000) When rewards compete with nature: The undermining of intrinsic motivation and self-regulation, Contemporary Educational Psychology 25, 54-67

Schmidt, F. & Hunter, J. (1998) The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings, Psychological Bulletin, 124, 262-274

Sadler-Smith, E. (1996) Approaches to Studying: age, gender and academic performance, Educational Studies, 22, (3), 367-379

Sadri, G. & Robertson, I. (1993) Self-efficacy and work-related behaviour: A review and meta-analysis, Applied Psychology: International Review, 42, 139–52

Sandelands, L., Brockner, J. & Glynn, M. (1988) If at first you don't succeed, try, try and try again: Effects of persistence-performance contingencies, ego involvement and self esteem on task persistence, Journal of Applied Psychology, 73, 208-216

Santamaria, N. (2001) The relationship between nurses personality and stress levels when caring for interpersonally difficult patients, Australian Journal of Advanced Nursing 18, 2, 20-26

Schmitt, N., Cortina, J., Ingerick, M. & Wiechmann, D. (2003) Personnel selection and employee performance. In Handbook of Psychology, eds. Borman, W. Ilgen, D. & Klimoski, R., 12:77-106. Wiley, New York

Seymour, R., McDougall, R., Wadsworth, C. & Sanders, B. (1982) Use of the interview in admissions, Journal of Allied Health, May, 88-95.

Shen, H. (1997) Predicting medical students' academic performances by their cognitive abilities and personality characteristics, Academic Medicine, 72, 9, 781-786

Shepard, K. (1980) Use of small group interviews for selection into allied health educational programs, Journal of Allied Health, May, 85- 94.

Silver, B. & Hodgson, C. (1997) Evaluating GPA's and MCAT scores as predictors of NMBE and clerkship performance based on students' data from one undergraduate institution, Academic Medicine, 72, 394-396

Stajkovic A. & Luthans, F. (1998) Self-efficacy and work-related performance: a meta-analysis, Psychological Bulletin, 124, 240-61

Steers , R. & Sanchez-Runde, C. (2002) Culture, motivation, and work behaviour. In The Blackwell Handbook of Principles of Cross-cultural Management, ed. Gannon, M. & Newman, K., 190-216. MPG Books, Bodmin, UK:

Steers, R., Mowday, R. & Shapiro, D. (2004) The Future of Work Motivation Theory, Academy of Management Review, 29, 3, 379-387

Stoddard, J., Hargraves, J., Reed, M. & Vratil, A. (2001) Managed care, professional autonomy and income: Effects on physician career satisfaction, Journal of General Internal Medicine, 16, 675-684.

Stokes, J., Sullivan, M., Riger, S. & Raja, S. (1997) Measuring Perceptions of the Work Environment for Female Faculty, The Review of Higher Education, 21, 1, 63-78

Streit-Forest, U. (1982) Differences in empathy: A preliminary analysis, Journal of Medical Education, 57, 65-67

Tangney, J. P., Baumeister, R. F. & Boone, A. L. (2004) High self-control predicts good adjustment, less pathology, better grades and interpersonal success. Journal of Personality, 72, 271-324.

Tella, A., Ayeni, C. & Popoola, S. (2007) Work Motivation, Job Satisfaction and Organisational Commitment of Library Personnel in Academic and Research Libraries in Oyo State, Nigeria, Library Philosophy and Practice, 4, 1-15

Tore, G., Vaglum, P., Tyssen, R., Ekeverg, O., Hem, E., Rovik, J., Finset, A. & Gronvold, N. (2005) Identification with the role of a doctor at the end of medical school: A nationwide longitudinal study, Medical Education 39, 66-74

Trapmann, S., Hell, B., Hirn, J. & Schuler, H. (2007) Meta Analysis of the ship between the big five and academic success at university, Journal of Psychology, 215, (2), 132-151

Trompenaars, F. & Hampden-Turner, C. (1997) Riding the Waves of Culture: Understanding Cultural Diversity in Business, Nicholas Brealey Publishing, 2nd ed.

Tross, S., Harper, J., Osher, I. & Kneidinger, I. (2000) Not just the usual cast of characters: Using personality to predict college performance and retention. Journal of College Student Development. 41, 323-334

Tyssen, R., Dolatowski, F., Rovik, J., Thorkildsen., Ekeberg, O., Hem, E., Gude, T., Gronvold, N. & Vaglum, P. (2007) Personality traits and types predict medical school distress: A six-year longitudinal and nationwide study, British Journal of Medical Education, 41, 8, 781-787.

Vargo, J., Madhill, H. & Davidson, P. (1986) The pre-admission interview as a predictor of academic grades and work performance, Canadian Journal of Occupational Therapy, 53, 4, 211- 215.

Van der maesen de Sombreff, P. (1992) Het rendement van personeelsselectie, Rijksuniversiteit, Groningen, Netherlands.

VandeWalle, D., Brown, S., Cron, W. & Slocum J. (1999) The influence of goal orientation and self-regulation tactics on sales performance: a longitudinal field test. Journal of Applied Psychology, 84, 249-59.

Vojir, C. & Bronstein, R. (1983) Applicant election procedures: a more objective approach to the interview process, Journal of Allied Health, May, 95-102.

Walker, J., Killip, D. & Fuller, J. (1985) Significance of the admission interview in predicting students' performance in dental school, Journal of Medical Education, 60, 569-571.

Walsh, W. & Holland, J. (1992) A theory of personality types and work environments, In W. Walsh, B., Craik, K. & Price, R. (Eds.), Person-environment psychology: Models and perspectives, Lawrence Erlbaum Associates, Hillsdale, NJ, 35-69.

Walton, S. (2007) A simple model for selection decisions in recruitment, Recruitment Journal, 9, 47-48

Watts, M. (1990) Physicians as role models in society, Western Journal of Medicine, 152, 3, 292

Weiss, D, Davis, R, England, G. & Loquist, L. (1967) Minnesota studies in vocational rehabilitation, 22, Minneapolis: University of Minnesota

Willingham, W. (1985) Success in college: The role of personal qualities and academic ability, New York. College Entrance Examination Board

Wilkinson, T., Wells, J. & Bushnell, J. (2004) Using a diary to quantify learning activities, Medical Education, 39, 7, 657- 664

Woodsmall, W. (1988) Metaprograms, Advanced Behavioural Modelling, Meta Publications Vienna, VA

Woodward, C., McAuley, R. (1983) Can the academic background of medical graduates be determined during internship, Canada Medical Association Journal, 122, 9, 567- 569

Wright, T., Blache, C., Ralph J. & Luterman , A. (1993) Hardiness, stress and burnout among intensive care nurses, Journal of Burn Care and Rehabilitation. 14, 3, 34-38

Zetik, D. & Stuhlmacher, A. (2002) Goal setting and negotiation performance: a meta-analysis, Group Process. Intergroup Relationships, 5, 35-52.