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The Impact of a Medical Curriculum on Motivation and Well-being Among Medical Students

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A thesis submitted in partial fulfilment of the requirements for the degree of

Doctor of Philosophy in Surgery, The University of Auckland, 2016
ABSTRACT

Aim

The aim of this thesis was to determine the impact of critical aspects of a medical curriculum on motivation and well-being, and how these constructs affect academic achievement among medical students.

Method

A multi-methods approach incorporating systematic review and quantitative and qualitative studies was undertaken. More specifically, this approach included reviewing the literature of motivation and well-being among medical students; exploring motivation and well-being by year level of a curriculum and admissions criteria (qualitative study); evaluating the effect of a medical curriculum on motivation and well-being over time (longitudinal study); examining motivation and well-being among ethnic groups (cross-sectional study); evaluating a change of medical curriculum on motivation and well-being (cross-sectional comparative study); and investigating associations between motivation, well-being and academic achievement (person-oriented approach).

Results

The systematic review found valuable associations between the constructs of motivation and well-being that were moderated by demographic and curriculum variables. Furthermore, it indicated a relationship may exist between motivation, well-being and academic achievement. The qualitative study found clear differences in student expression between admissions criteria and year level, suggesting that the curriculum and sociocultural influences are mediators of motivation and well-being. Furthermore, changes in motivation and well-being occur longitudinally, which
differ by year level of the curriculum and admissions criteria. The cross-sectional study found differences in motivation and well-being among indigenous and ethnic minority medical students. The comparative cohort study found no significant differences in motivation and well-being between cohorts of medical students under traditional and revised curricula; however, differences were found among students in their clinical years of training. Finally, associations between motivation and well-being were observed, which had a relationship with academic achievement over time.

**Conclusion**

A medical curriculum has an impact on motivation and well-being, which differs by year level, admissions criteria, and ethnicity. Furthermore, a relationship exists between motivation and well-being, and academic achievement. These findings have implications for student recruitment and retention, student equity and curriculum development, and highlights the challenges of facilitating learning environments and curricula that support optimal forms of motivation and enhance well-being for all students.
DEDICATION & ACKNOWLEDGMENTS

“He wāta kirihi ahau nō te mara o Hineamaru”

“I am a watercress from the garden of my ancestor Hineamaru”

He mihi nui ki ōku kuia me ōku kaumātua me tōku whānau hoki. Completing a medical degree and a PhD is about starting a whakapapa, laying a tūāpapa or foundation in higher learning for my whānau – for the mokopuna, the nieces and nephews, and the future generations. I thank my grandparents, my nana Huhana, my mum and dad, and my siblings for being the example for me. Nōku ēnei i whakatō i te kākano o Te Reo me te mātauranga kia mātou – they instilled the importance of Te Reo and education for me.

He mihi nui kia Gwen Te Pania Palmer and Ngati Hine Health Trust, ki tōku īwi o Waikato Tainui mo o koutou manāki i ahau. Geraint Martin and Pam Tregonning at Counties Manukau District Health Board for your tautoko and your manāki – for supporting me through medical school and my PhD. I was recruited into the CMDHB Health Foundation Scholarship Programme from Tangaroa College. The programme aimed to increase the health workforce from South Auckland by supporting students through their health studies and to then return to work at the CMDHB. I am one of these students. When I entered the programme in 2005 there were only my best friend Michael and I from ‘TC’. Now, in 2015, there is a Health Science Academy at TC with 50 students coming through the pipeline with the aspirations of studying in the health professions. I hope that my PhD findings can support the pipeline – to recruit and retain more high school students from South Auckland, from Ngati Hine, from Tainui, from under-representation. It’s avenues such as these that I believe can help close the health and poverty gap.

To Prof Hill – thank you for shaping my future. A favourite word of mine is serendipity, and that moment when you pulled me aside after the ward-round was one of them.
I entered medical school wanting to be involved in wider health. I didn’t know what that would be like, but you created the opportunity for me to find out. Your mentorship, direction and support has set me on the path I was trying to find.

Prof has always said research is a team sport. To the co-captain, Marcus Henning – thank you for keeping my head above water. For your passion and enthusiasm for medical education and for your time and energy in supporting me through. Your favourite question to me is always “how’s your quality of life?” – thanks for looking out for me. To the crew at South Auckland Clinical Campus, Maria Vitas, who knows me all too well, since third year of medical school when I’d be running to her to get my assignment in on time. I still run to her now in times of need and she knows how to get me sorted – thank you! To the research team, who have been my best friends and whanau on this journey, and to Wendy and Louanne who guided me throughout the PhD. I’ve enjoyed it all the way, and I couldn’t ask for anyone better to share it with.

To Ko Awatea, Jonathon and Haidee. And Sybil! Thank you for the experiences, the learning, the mentorship, the moments, the problem solving, the adventures and the laughter. You’ve been a big part of influencing the path I’ve been trying to find, and in shaping the path I’m embarking on after my PhD.

To all of my friends who have been supportive of me. And to my beautiful Dickson, who has been my backbone. You’ve been here with me all of the way through this. Thank you for your hard work, your love. I can’t wait to spend the next stage of my life with you – without the PhD!

“Ahakoa iti tōku iti ka tūria ahau i runga i ngā maunga katoa o tēnei ao”
“Though I am small I can stand upon the highest mountains”
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INTRODUCTION

This chapter aims to provide a comprehensive review of the relationship between curriculum assessment methods and the well-being of medical students. It will explore various assessment methods and their impact on student well-being, including burnout and quality of life. The chapter is structured as follows:

1. **Method**
   - Study setting
   - Subjects, procedures and instruments used
   - Critical appraisal frameworks
   - Exclusion criteria
   - Inclusion criteria
   - Outcomes
   - Statistical analyses and ethics approval

2. **Results**
   - Critical appraisal of the included studies
   - Summary of findings

3. **Discussion**
   - Interpretation of results
   - Limitations of current research
   - Important areas for future investigation

4. **Conclusion**
   - Summary of key findings
   - Implications for practice
   - Recommendations for further research

This systematic review will contribute to the understanding of how different assessment methods can affect the well-being of medical students, providing insights for the development of more effective and supportive educational environments.

**Questions Addressed:***

- What is the relationship between assessment stress or anxiety and performance?
- What are the limitations of current research?
- What assessment-related factors are associated with medical student stress or burnout?
- How have researchers measured assessment stress or anxiety?
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<th>Description</th>
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<tr>
<td>AMS</td>
<td>Academic Motivation Scale</td>
</tr>
<tr>
<td>BM</td>
<td>Burnout Measure</td>
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<tr>
<td>CBI</td>
<td>Copenhagen Burnout Inventory</td>
</tr>
<tr>
<td>CET</td>
<td>Cognitive Evaluation Theory</td>
</tr>
<tr>
<td>EM</td>
<td>Extrinsic motivation</td>
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<tr>
<td>GPA</td>
<td>Grade point averages</td>
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<tr>
<td>GT</td>
<td>Goal Theory</td>
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<tr>
<td>IM</td>
<td>Intrinsic motivation</td>
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<tr>
<td>LSM</td>
<td>Least square mean</td>
</tr>
<tr>
<td>MBI</td>
<td>Maslach Burnout Inventory- Student Survey</td>
</tr>
<tr>
<td>MCQ</td>
<td>Multiple choice question</td>
</tr>
<tr>
<td>MSLQ</td>
<td>Motivated Strategies for Learning Questionnaire</td>
</tr>
<tr>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>OSCE</td>
<td>Objective structured clinical examination</td>
</tr>
<tr>
<td>PPS</td>
<td>Personal and Professional Skills</td>
</tr>
<tr>
<td>PT</td>
<td>Progress test</td>
</tr>
<tr>
<td>QOL</td>
<td>Quality of life</td>
</tr>
<tr>
<td>RRAS</td>
<td>Regional Rural Admission Scheme</td>
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<tr>
<td>SCT</td>
<td>Social Cognitive Theory</td>
</tr>
<tr>
<td>SDT</td>
<td>Self-Determination Theory</td>
</tr>
<tr>
<td>SE</td>
<td>Standard error</td>
</tr>
<tr>
<td>SES</td>
<td>Socioeconomic status</td>
</tr>
<tr>
<td>SP</td>
<td>Standardized patient</td>
</tr>
<tr>
<td>UAHEPC</td>
<td>University of Auckland Human Participants Ethics Committee</td>
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CHAPTER 1

Introduction
Being a doctor offers opportunities to save lives, care for people, promote population health and equity, delve into the complexity of human biology and promulgate medical research (1, 2). It also provides career development opportunities, a respected social status and financial security (1, 2). The motives for studying medicine are therefore heterogeneous and far-reaching.

According to self-determination theory (SDT), these motives are considered a continuum consisting of intrinsic motivation (IM), extrinsic motivation (EM) and amotivation (AM) (3). IM is the motivation for an activity, because of genuine interest, satisfaction or enjoyment. EM, in contrast, involves motivation for external rewards, avoidance of negative outcomes or pressure from others, and AM is lacking any motivation to engage in an activity. For medical students, IM for studying medicine may include intellectual curiosity and stimulation, whereas EM may include helping people, social prestige, financial gain and parental influence, and AM would likely depict a student who studies medicine without any real interest (1, 4, 5). Often, the choice to study medicine results from a complex interplay between IM and EM and is influenced by a number of factors, including underlying sociodemographic influences (6, 7).

Once students are admitted into medical school, the curriculum will likely have an impact on both their motivation and their well-being because it requires them to adapt to the learning environment and lifestyle changes (8). Studies with medical students in their first year of medical school have found that IM declines, whereas deficits in social interactions, hours of sleep and physical activity increase (8-10). As students progress into the latter years of medical school, it is a time often characterised by increasing EM, and long hours on call, exposure to adversity, anxiety and uncertainty in a clinical learning setting (10, 11).
These findings are consistent with other studies noting that medical students are vulnerable to psychological distress as reflected by the high incidence of complaints of depression, burnout and poor quality of life (QOL) among medical students (12). These experiences of psychological distress and poor QOL can influence changes in motivation and can have an impact on academic achievement (Figure 1.1) (10, 13, 14).

Figure 1.1 Interrelationships among motivation, QOL and academic achievement

After acknowledging that medical students are generally highly motivated individuals but vulnerable to psychological distress, attention must turn to ways in which this can be addressed during the course of their studies. The obvious focus is the curriculum, which is unique to each medical school in terms of delivery, content, the hidden curriculum and clinical transitions (15). While calls have been made for curriculum reforms to enhance motivation and address the sources of distress, findings by Kusurkar et al (15) suggest that motivation theory has not been a significant driver of curriculum reform, and is undervalued in curriculum development. Similarly, Slavin et al (16) have reported how interventions to improve student well-being have focused largely on improving access to health services and
implementing ancillary wellness programmes, rather than directly addressing the root causes of distress that may lie within the curriculum itself.

To address these challenges, the University of Auckland medical programme has embarked on the implementation of a revised curriculum that aims to improve motivation and well-being among students through changes to assessment methods and curriculum domains (17). However, with any changes to a curriculum, it is important that the impact of such changes is carefully evaluated. Therefore, the aim of this research was to determine the impact of certain aspects of the medical curriculum on motivation and well-being, and how these constructs affect academic achievement among medical students.

The remainder of this introductory chapter provides an overview of this curriculum and then outlines the objectives of this research. This chapter also discusses the study design, the theoretical framework and the significance of this research.

The University of Auckland Medical School Curriculum

The medical curriculum consists of five years of study that follow on from a premedical year of health sciences or biomedical sciences (termed ‘overlapping Year 1’). The five years of study are structured across three phases (Figure 1.2) (18). Each phase of the curriculum builds on the prior phase, and student competencies are expected to build throughout the programme. The first phase (Year 2 and Year 3) is considered the ‘pre-clinical’ years and has a focus on science within clinical medicine; this is followed by the second phase, which is clinically oriented (Year 4 and Year 5), and the third phase, which prepares the student for the medical workforce (Year 6).
Figure 1.2 The University of Auckland medical programme (18)

The three phases align with the graduate learning outcomes. These outcomes indicate the competencies expected by the end of medical school and on entry to the workforce as a first-year House Officer. They also guide teaching and assessment and provide direction for students for their self-directed learning.

The graduate learning outcomes are organised into five curriculum domains. They are:

- **Applied Science for Medicine**
- **Clinical and Communication Skills**
- **Personal and Professional Skills**
- **Hauora Māori (Māori Health)**
- **Population Health**

---

1 The Hauora Māori (Māori Health) domain aims to foster a critical understanding of the social, cultural, political, economic and environmental determinants impacting on the health of Māori (indigenous New Zealanders).
These domains define the breadth of skills and experiences required for effective clinical practice in New Zealand (18). They are used as a mechanism to structure the curriculum and to promote vertical and horizontal integration.

**Curriculum model and reinvigoration**

The curriculum model is described as a hybrid of traditional and novel educational methods (17). The traditional methods include lectures and apprenticeship-style clinical attachments (17). The novel approaches include mastery-type learning of skills, small group work, experiential and scenario-based learning, and online learning that includes opportunities for self-assessment (17). Both methods are delivered through organ systems-based modules and clinical-based attachments through which the domains of the curriculum are woven.

From 2013, a revised medical curriculum was implemented at the University of Auckland with the aim of improving self-directed learning and encouraging greater integration of basic science and clinical practice (17). Additional aims were incorporated to foster leadership and teaching skills, and to promote health and well-being among students (17). Revisions to the curriculum are outlined in Table 1.1 and included the following.

*Introduction of progress testing*

Progress testing is a method of longitudinal assessment to examine applied medical knowledge across all phases and domains of the curriculum (17, 19). Three progress tests are sat by students in all year levels with the aim of assessing graduate-level knowledge. The results of each individual test are combined to inform decision making on progression into subsequent year levels (17).

Because progress tests are longitudinal measurements, it is assumed that students will be less anxious about passing or failing a single test, as a cross-sectional failure has little impact on a series of good results (19). Furthermore, their longitudinal
nature also encourages continuous learning and may lead to deeper and intrinsically motivated learning (19, 20).

**Introduction of a set of clinical scenarios**

Approximately 190 clinical scenarios form the central building blocks for, and aim to effectively define, the core curriculum of the Bachelor of Medicine & Bachelor of Surgery (MBChB) programme. Each scenario gives a brief outline of the learning objectives for each of the five curriculum domains. The purpose of the clinical scenarios includes guiding independent learning, providing an integrating mechanism for learning both within a year and across years, and providing a core curriculum irrespective of the location of learning during the clinical phases (Phase 2 and Phase 3) (17).

**Addition of a curriculum domain**

Aspects of the previous domain of clinical, professional and research skills were integrated to create a new Personal and Professional Skills domain. This additional educational domain aims to foster leadership and teaching skills and to promote health and well-being among students (17). The key topics of the health and well-being component include stress and mind-body medicine, exercise and nutrition, study skills, healthy thinking, and the impact of doctors’ health on patient safety.
Table 1.1 Summary of a revised curriculum implemented at the University of Auckland (17)

<table>
<thead>
<tr>
<th>Summary of Curriculum Revisions</th>
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<tbody>
<tr>
<td>Teaching &amp; Learning</td>
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<tr>
<td>Year 2</td>
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<td>Year 4</td>
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<td>Year 5</td>
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<td>Assessment</td>
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<td>All year levels</td>
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<td>Year 2</td>
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<td>Year 4</td>
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<td>Curriculum Domains</td>
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<td>E-learning</td>
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<td>Clinical Attachments</td>
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<td>Year 4</td>
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<td>Year 4 to Year 6</td>
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</table>

**Research Aim**

The aim of this research was to determine the impact of critical aspects of a medical curriculum on motivation and well-being, and how these constructs affect academic achievement among medical students.

**Research Design**

In order to address the research aim, a multi-methods approach incorporating systematic reviews and quantitative and qualitative studies was undertaken with the following research objectives:
1. To systematically review the literature in relation to motivation and well-being among medical students (Chapter 2 – systematic review)

2. To explore motivation and well-being by year level of a curriculum, and how it may differ among subgroups of medical students (Chapter 3 – qualitative study)

3. To evaluate the effect of a medical curriculum on motivation and well-being over time (Chapter 4 – longitudinal study)

4. To examine motivation and well-being among indigenous and ethnic minority medical students (Chapter 5 – cross-sectional study)

5. To systematically review assessment methods, and evaluate a change of medical curriculum on medical student motivation for learning and well-being (Chapter 6 – systematic review, Chapter 7 – comparative cohort study)

6. To determine the associations between medical student motivation, well-being and academic achievement (Chapter 8 – person-oriented study)

The summary narrative of this research is that it explores student motivations for attending medical school, their experiences of the medical school curriculum and how it impacts their motivation and well-being. It then considers whether a revised curriculum has an impact on motivation and well-being, and then seeks to determine whether there are associations between these constructs and academic achievement.

This research starts with a systematic review that summarises and critically appraises the medical education literature regarding motivation and well-being, the curriculum and demographic factors that influence these constructs, and associated learning outcomes (Chapter 1). It identifies gaps in the literature on these issues and therefore the rationale to explore motivation and well-being during medical school
(Chapter 2), including longitudinally across year levels of a curriculum (Chapter 3) and by ethnicity (Chapter 4). It then systematically reviews assessment methods used within medical curricula (Chapter 5), prior to investigating the effect of a revised curriculum on motivation and well-being (Chapter 6). Finally, it establishes the associations among motivation, well-being and academic achievement by using a person-oriented approach (Chapter 7). Implications of this research and future directions are then considered.

**Theoretical Concepts**

**Motivation**

There is no standardised, accepted definition of motivation in the literature. However, there are many theories of motivation with associated definitions (Table 1.2). According to Deci and Ryan (3) motivation is what drives an individual to act, behave or do something. Individuals with no impetus are considered unmotivated, whereas those who are energised or activated towards a goal are motivated. Other theories relate motivation to a force that initiates and sustains activity while working towards mastery goals (the desire to understand or master a task) or performance goals (to demonstrate ability compared with others (21). In comparison, expectancy-value theory suggests that every individual has a motivation to succeed and a motivation to avoid failure, which is also dependent on the degree to which one values the task or the perceived outcomes of the task.

Motivation can be viewed as a characteristic that people have more or less of and psychologists who focus on this method have examined motivation according to conditions, rewards, reinforcement, or feelings of self-efficacy - comparing those high in motivation with those with little to none (22, 23) In contrast, SDT is based on
a multidimensional view of motivation that distinguishes the quantity or amount (high or low), from the quality or type of motivation (intrinsic or extrinsic) (3).

Table 1.2 Theories of motivation

<table>
<thead>
<tr>
<th>Theory</th>
<th>Author</th>
<th>Definitions</th>
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<tbody>
<tr>
<td>Self-determination theory</td>
<td>Deci &amp; Ryan</td>
<td>A focus on quality of motivation including intrinsic motivation (IM) (for personal interest and enjoyment) and extrinsic motivation (EM) (for personal gain or to avoid punishment). IM is dependent on fulfilment of the psychological needs of autonomy, competence and relatedness (3).</td>
</tr>
<tr>
<td>Goal theory</td>
<td>Pintrich</td>
<td>Motivation is explained on the basis of goals: mastery goals (the desire to understand or master a task) and performance goals (to demonstrate ability compared with others) (21).</td>
</tr>
<tr>
<td>Social cognitive theory</td>
<td>Bandura</td>
<td>Motivation is based on perceived self-efficacy (confidence and belief in one’s ability to succeed in specific situations) (24).</td>
</tr>
<tr>
<td>Expectancy-value theory</td>
<td>Atkinson</td>
<td>Motivation is influenced by the degree to which one expects to succeed at a task and the degree to which one values the task or the perceived outcomes of the task (25).</td>
</tr>
<tr>
<td>Attribution theory</td>
<td>Weiner</td>
<td>Motivation is influenced by how one attributes causal explanations for events (either internal attributions or external attributions) (26).</td>
</tr>
<tr>
<td>Hierarchy of needs</td>
<td>Maslow</td>
<td>Motivation reflects a need for self-actualisation. When basic needs are satisfied self-actualisation can occur (27).</td>
</tr>
</tbody>
</table>

Each theory of motivation are independent lines of research, but there are overlapping elements among them. The constructs of mastery goal orientation (GT) and self-efficacy (SCT) are consistent with the characteristics of IM (SDT), and performance orientation (GT) is consistent with the characteristics of EM (SDT) (28). Therefore, constructs within the frameworks of SDT, SCT and GT are drawn upon throughout this research. However, SDT is the predominant theoretical framework underpinning the research, as it is one of the most utilised theoretical approaches in the motivation literature and it offers a multidimensional view of motivation with a focus not just on the quantity of motivation but also on the quality of motivation (3).
This differentiated conceptualization is a distinguishing feature of the theory, as other motivation theories, including self-efficacy theory and expectancy-value theory, hold motivation to be a unitary, quantitative construct and suggest that a higher amount of motivation should yield more optimal outcomes (29). SDT, in contrast, suggests that higher levels of motivation do not necessarily yield more desirable outcomes if the motivation is of a poor quality. As quality of motivation purports to predict specific behavioural outcomes such as academic achievement, SDT can be a useful theory for examining motivation in academic environments such as medical schools (30, 31). Within the medical education context, it is also considered highly relevant as it defines differences between higher levels of motivation, differentiates between the type of motivation, and examines factors in social contexts that can influence the quality of motivation. It also has a validated measurement tool (Academic Motivation Scale (32), has been shown to help medical educators to understand and foster important components of teaching and learning, and has relevance for development and reform of medical education curricula (15, 33).

**Overview of self-determination theory**

According to SDT, individuals differ in both the quantity and the quality of their motivation. Quantity of motivation can be high or low, whereas quality of motivation depends on whether the source of motivation is internal or external. SDT considers quality of motivation more important than quantity and therefore proposes a continuum for quality of motivation. This self-determination continuum of regulatory styles encompasses IM, EM and AM (Figure 1.3) (34).
Intrinsic motivation

As previously described, IM is derived out of genuine interest in or enjoyment of an activity (35). While Deci and Ryan theorise IM as one construct, Vallerand and colleagues (32) have distinguished three types of IM: IM to know (IMTK), IM to accomplish (IMTA) and IM to experience stimulation (IMTES). When applied to student learning, IMTK is the process of engaging in learning because of the inherent pleasure and satisfaction that is experienced while learning, exploring or trying to understand something new. IMTA is engaging in learning because of the pleasure and satisfaction gained from attempting to accomplish or create something new. IMTES involves learning because of the stimulation experienced, such as fun or excitement during the learning process.Regardless of the type of IM involved, all represent examples of behaviours that are autonomously regulated and self-determined (31).

SDT assumes that all individuals have an innate drive towards IM when the psychological needs of autonomy, competence and relatedness are fulfilled (3). A need for autonomy describes acting out of one’s own volition, such as choosing
between learning tasks. A need for competence relates to one’s feeling of being able to achieve desired goals such as mastering the learning material or being good at knowledge or skills tasks. A need for relatedness refers to one’s feeling of connectedness and the relationships with significant others such as parents, peers, teachers and mentors (36). When applied to a medical education context, medical students who are learning medicine out of their own free will (autonomy), who feel capable (competence) and who have a strong sense of connection with mentors, peers or patients (relatedness) are more likely to be intrinsically motivated (37).

**Extrinsic motivation**

EM is considered a means to an end and not for its own sake (35). Unlike their theorisation of IM, which they consider one construct, Deci and Ryan (35) have identified four types of EM: external regulation, introjected regulation, identified regulation and integrated regulation. When applied in the context of learning, external regulation means learning because of purely external factors such as rewards or avoidance of negative outcomes such as failing examinations. In comparison, introjected regulation is learning because of approval from oneself or from others. In this context, learning is usually performed to avoid anxiety or guilt or to maintain feelings of pride and self-worth. In addition, identified regulation is learning because there is acceptance of its importance and value, such as its role in preparing for one’s future career. Finally, integrated regulation means learning because it contributes to defining who one is – it becomes a part of one’s sense of self.

These four types of EM are ordered along a continuum with external regulation and introjected regulation representing less autonomous and self-determined behaviours and identified and integrated regulations representing more autonomous and self-determined behaviours (Figure 1.3). Through the process of internalisation, an
individual’s regulation can change from more external to more internal, thus moving along the continuum. Internalisation is facilitated through fulfilment of the psychological needs of autonomy, competence and relatedness as described above.

**Amotivation**

AM refers to behaviours that are driven by neither EM nor IM. Individuals who are amotivated will either not act or act with no intention (3). It results from an individual not valuing a behaviour or outcome, or not feeling competent to do the behaviour. On the continuum of motivation, AM is considered the lowest level of autonomy and self-determined behaviour (3).

**Multidimensionality and Associated Outcomes**

SDT posits that individuals may possess more than one type of motivation when engaging in an activity over time (33). Thus, individuals can have combinations of IM and EM (37). Kusurkar and colleagues (38) elaborated further on this within a medical education context by studying the motivational profiles of medical students. They suggested that medical students with both high IM and high EM for studying medicine find learning medicine interesting, but can also be motivated by the prestige of attending medical school. In comparison, students with low IM and EM for studying medicine may be indifferent to the choice of studying medicine, but have gained entry to medical school and have decided to try it. These profiles have also been observed in other studies in medical education (1, 39).

The types of motivation behind medical students’ learning are important to delineate, as these are known to influence academic performance (36), learning behaviour (40) and specialty choice (41-43). It has been demonstrated that IM leads to deeper learning, less superficial information processing, greater creativity, higher achievement and intention to continue in medical studies (36).
The type of motivation can also have important consequences for well-being. SDT posits that an emphasis on IM is associated with healthier lifestyles and behaviours and higher levels of psychological well-being (34). For example, Pisarik (13) examined the relationship between motivation for learning and burnout among undergraduate college students. Consistent with SDT, Pisarik concluded that IM was associated with lower levels of burnout, whereas EM and AM were associated with higher levels. Similarly, a relationship between IM and enhanced well-being has been shown in both general and medical education studies (37, 44, 45).

**Well-being**

The term ‘well-being’ is a multidimensional construct and has been conceptualised within this thesis through measurement of QOL and burnout. Well-being and QOL are closely related and have been considered synonymous in both medical education research and the wider literature (46-48). Similarly, well-being has been conceptualised in the medical education literature as a lack of burnout (49, 50). Therefore, the terms QOL and burnout (or lack of) are used throughout this research to consider and make reference to medical student well-being.

It is important to acknowledge that QOL and burnout are likely related constructs (51). This relationship can be conceptualised as a continuum. At one end, low levels of QOL likely encompass burnout and psychological distress, and at the other end, high levels of QOL likely encompass euphoria and happiness (52). This continuum can enable consideration of both the negative and the positive facets of QOL among medical students.

*Quality of life*

QOL is complex to define as it can encompass health status, happiness, life satisfaction and well-being (53). For the purposes of this research, the World Health
Organization’s definition of QOL is used as it has been applied in a medical education context and has a validated instrument for measuring QOL (8, 54). It is defined as “the individual’s perception of his position in life, within the context of culture and system of values wherein the individual lives and in relation to his objectives, expectations, standards and concerns” (p. 1405) (55). This definition encompasses function, global perceptions and personal viewpoints, and how these directly apply to an individual’s life (55). Within this context, key facets of QOL relate to individuals’ perceptions of their physical and psychological state, their social relationships and their living environment.

**Burnout**

The term ‘burnout’ was first used by Freudenberger (56) to describe the gradual emotional depletion, loss of motivation and reduced commitment experienced by human services workers chronically exposed to the distress of their clients. Since that time, its precise definition has proved elusive. In the first major review on burnout, by Pearlman and Hartman (57), more than 48 definitions were proposed. Edelwich and Brodsky (58) defined burnout as a progressive loss of energy, idealism and purpose. In comparison, Schaufeli and Greenglass (59) proposed that burnout is a state of “physical, emotional, and mental exhaustion that results from long-term involvement in work situations that are emotionally demanding” (p. 501). Because of the multitude of definitions, a debate among scholars on the nature of burnout continues. The debate is centred on the dimensionality of burnout and the context in which it takes place. Arguably, the most commonly accepted definition has come from Maslach and colleagues (60), who described burnout as a multidimensional condition comprising emotional exhaustion, depersonalisation (cynicism) and reduced personal accomplishment among individuals “who work with people in some capacity” (p. 4). The Maslach Burnout Inventory (MBI), based on Maslach’s
multidimensional view of burnout, is the most widely used measure of burnout in scientific publications and is commonly utilised in medical education research (61, 62).

Proponents of a one-dimensional view of burnout, such as Kristensen et al and Pines and Aronson, maintain that the core of burnout is fatigue and exhaustion (63, 64). Measures of burnout such as the Copenhagen Burnout Inventory (CBI) and the Burnout Measure were both conceived as one-dimensional questionnaires measuring exhaustion (63, 65). Kristensen et al (63) suggested that burnout could also be conceptualised as taking place generally (personal burnout), and also taking place in specific contexts or domains of a person’s life (work-related and client-related burnout). Consistent with these domains, the CBI contains three subscales to measure personal burnout, work-related burnout and client-related burnout. This contrasts with the MBI, which measures burnout in relation to both working with recipients such as patients and work-like activities such as studying or volunteering (66).

Although there are multiple definitions of burnout, the definition used for this research is based on the view of Kristensen et al (67) that burnout is characterised by fatigue and exhaustion, and is defined as “a state of physical, emotional and mental exhaustion that results from long-term involvement in work situations that are emotionally demanding” (p. 501) (59). This definition was chosen because it has been previously applied in a medical education context and has a validated and widely accessible inventory (the CBI) to measure burnout. In addition, the CBI was found to be a superior measure of burnout in a study among health professionals when compared with the MBI, another commonly used burnout inventory (68).
Measurement of burnout and quality of life

In accordance with these definitions, QOL and burnout have been measured by the abbreviated version of the World Health Organization Quality of Life (WHOQOL) questionnaire, the WHOQOL-BREF, and the ‘personal burnout’ subscale from the CBI (54, 67). Both the WHOQOL-BREF and the CBI have been used in a number of studies of QOL and burnout during medical training, both nationally in Australia and further abroad (14, 69, 70). The WHOQOL-BREF has also been validated for use among New Zealand (NZ) medical students (71).

Significance of the Research

There is increasing recognition of the need to maintain medical students’ motivation for learning and well-being if they are to successfully complete medical school and continue on into their postgraduate specialty training (11, 72). However, studies suggest that medical curricula can have a significant impact on motivation and well-being (12, 33). The findings of this research aim to determine such an impact in the context of a revised curriculum in order to understand the student experience of medical school from an equity and curriculum development perspective.

This research also serves to highlight the challenges of facilitating curricula and learning environments that support optimal forms of motivation and enhances well-being for all students. In summary, this research aims to provide a basis to improve medical training to optimise the motivation, the learning and the well-being of future clinicians.
CHAPTER 2

A systematic review of motivation and well-being among medical students
Introduction

To effectively develop the knowledge, skills and competencies expected of clinicians, there is evidence to suggest that medical students need to maintain functional levels of personal health and well-being (11). However, the intensity of the medical training process may have unintended negative consequences (10, 12). Medical students are more likely to manifest symptoms of depression and anxiety when compared with non-medical peers and the general population. These findings are consistent with studies that have shown that medical students are vulnerable to psychological distress such as stress, burnout and poor mental QOL that can impact motivation for learning and academic achievement (10, 14).

These associations have been observed in the medical education literature. Findings from Kusurkar et al (37) suggested that medical students who are more intrinsically motivated experience less exhaustion from study and achieve higher grade point averages (GPAs) when compared with students who are more extrinsically motivated or who have low motivation (33). Similarly, studies of medical student motivation and well-being have also shown significant correlations between the type of motivation, and stress, anxiety and QOL, and academic achievement (14, 73).

However, despite these findings, studies of the relationship between motivation and well-being in medical education remain scarce, dispersed and seemingly heterogeneous. Therefore, a systematic review was conducted to summarise and critically appraise the current evidence base for the relationship between motivation and well-being among medical students as a platform for future research. To address this aim, the following research questions are addressed in this review:

1. How have researchers measured motivation and well-being among medical students?
2. What factors influence motivation and well-being among medical students?

3. Which specific motivational orientations are associated with enhancing or adversely affecting well-being, and vice versa?

4. What are the effects of motivation and well-being on medical student academic achievement?

5. What are the limitations of current research in this area?

Method

In December 2013, a literature search was conducted of four electronic databases: MEDLINE, EMBASE, PsycINFO and ERIC. The search terms that were used were grouped into three key concepts: ‘motivation’, ‘well-being’ and ‘medical students’.

Theories of motivation and their associated concepts were incorporated into the search terms for this review and included motivation, self-efficacy, extrinsic and intrinsic motivation, self-determination theory, social cognitive theory, goal theory, expectancy-value theory, achievement motivation, drive, stimulus, impetus, interest, and amotivation.

Similarly, as the term ‘well-being’ is a multidimensional construct, a variety of keywords were used, including quality of life, mental health, depression, anxiety, distress, happiness and burnout. Search terms for ‘medical students’ included both medical students and medical education. The search was limited to articles published in English. A bibliographical management program (EndNote X6, Thomson Reuters, New York) was used to create a search library and the references for the research articles were retrieved for examination. The following guidelines were adhered to with regard to the search strategy:
1. All identified abstracts were reviewed and full articles were retrieved by the reviewers when it was clear that they contained discussion about medical student motivation and well-being.

2. The researcher met with an independent reviewer to select articles for critical appraisal and review. Any discrepancies in opinion were identified and final agreement was reached after face-to-face discussion between the researcher and reviewer.

3. A hand search of the reference lists from these articles was conducted to determine further articles that could be considered for this review.

4. The reviewers met to determine and select articles for critical appraisal and review based on explicit inclusion and exclusion criteria (below).

5. Each selected article for review was analysed and data were collected independently by the researcher and the independent reviewer.

**Inclusion criteria**

1. All study participants were medical students (individuals enrolled in a school of medicine).

2. Study measures encompassed both medical student motivation, and well-being (including QOL, and/or stress, depression, anxiety, distress, happiness, burnout).

**Exclusion criteria**

1. Full text of article not published in English

2. Study results duplicated in separate earlier publications

3. Brief descriptive, commentary or review articles

4. Studies published prior to 1990
Critical appraisal

Each selected article was analysed independently by at least two reviewers and data extracted using a critical appraisal instrument (Table 2.1) (74). To integrate the extracted data, a thematic analysis was performed. The most relevant themes from each article were identified and grouped according to the research questions within this review.

To assess the quality of the studies included in the review, the reviewers considered risks of bias within each study, including methods of recruitment, assessment of outcomes and reporting of outcomes. This framework was not constructed to exclude methodologically weak studies, but rather as an aid for reviewers to draw conclusions about the validity and reliability of the evidence presented in each study. Any discrepancies between the reviewer selections were identified and consensus was reached after face-to-face discussion.

Table 2.1 Data extraction and critical appraisal instrument

<table>
<thead>
<tr>
<th>Study introduction</th>
<th>Research objectives and rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study context</td>
<td>Study setting, participant characteristics, description of the medical programme</td>
</tr>
<tr>
<td>Study methods</td>
<td>Study design, participant recruitment, study duration and follow-up, description of measures of motivation and well-being, assessment of study outcomes, methods of statistical analysis</td>
</tr>
<tr>
<td>Study results</td>
<td>Main study findings</td>
</tr>
<tr>
<td>Study conclusions</td>
<td>Future implications and new insights</td>
</tr>
<tr>
<td>Risks of bias within each study</td>
<td>Selection bias, outcome bias</td>
</tr>
</tbody>
</table>

Results

The search strategy yielded 2,731 articles. A total of 26 articles were identified by two independent reviewers as potentially relevant based on the inclusion and exclusion criteria and after screening the titles and online abstracts of the initial 2,204 articles (after removal of duplicates). These were obtained as full texts for review.
An additional five papers from a hand search of key journals and from reference lists were also included. Of the 26 articles identified, the inclusion and exclusion criteria were used to select a total of nine articles for critical appraisal (Figure 2.1). Of these studies, one was qualitative and eight were quantitative.

Study Question 1: How have researchers measured motivation and well-being among medical students?

The most common method of measuring motivation was self-reported questionnaires adapted from pre-existing tools. An adapted version of the Academic Motivation Scale (AMS) by Vallerand et al (32) was used in three studies (37, 73, 75).
Three studies used subscales of the Motivated Strategies for Learning Questionnaire (MSLQ) (11, 14). Artino et al (77) also used subscales from their previously published studies, which measured task value and self-efficacy (77). The Achievement Motivation Scale was used by Srivastava et al (78).

Self-reported questionnaires were also the most common method of measurement of well-being. These questionnaires were created or adapted by investigators in order to measure stress, anxiety, exhaustion, boredom, depression, enjoyment and QOL. The WHOQOL-BREF measuring dimensions of QOL was used in three studies (11, 14). The Beck Depression Inventory, which evaluates the presence and severity of various depressive symptoms, was used in two studies (73, 76). Other tools used to measure well-being included the Achievement Emotions Questionnaire (AEQ) (77), the Social Adjustment Scale–Self-Report (SAR–SR) (76), the Beck Anxiety Inventory (BAI) (76), the Maslach Burnout Inventory–Student Survey (MBI–SS) (37), the Medical Stress Scale (MSS) (73), the Hamilton Rating Scale for Depression (HAM-D-17) (73) and the Institute for Personality and Ability Testing (IPAT) (78).

**Study Question 2: What factors influence motivation and well-being among medical students?**

**Phase of curriculum**

Four studies reported associations between the phases of the medical curriculum and motivation and well-being. Findings from Park et al (73) showed that students in their first year of medical school experience higher levels of stress compared with students in their second and third year of medical school. Similarly, Del-Ben (76) reported high levels of anxiety among first-year medical students that increased during an academic year; and a decline in the quality and time available for leisure activities.
In the same study by Del-Ben (76), there was also a significant reduction in IM scores, identified EM scores and introjected EM scores during the academic year. However, there were no significant changes in external regulation and AM scores.

Srivastava et al (78) assessed changes in motivation and well-being at three points over a three-year period. The findings from this study showed a significant decrease in achievement motivation and an increase in physiological complaints by students. However, there were no differences in anxiety scores and psychological adjustment over the same period.

Henning et al (11) conducted focus groups to explore factors that influence motivation to learn and QOL among medical students during the clinical phase of a medical curriculum. This study identified that anxiety and uncertainty in the clinical setting, transport issues to access clinical attachments, sleep deprivation and isolation from peer groups can negatively influence motivation to learn and QOL. However, positive experiences that provided insights into future clinical practice had a positive influence on motivation to learn and QOL.

Demographic characteristics
An interaction between the demographic characteristics of students and their motivation and well-being was reported in two studies. Henning et al (79) examined the relationship between QOL, motivation to learn and demographic variables, including age, gender and ethnicity. In this study, Asian medical students were compared with NZ European medical students. The findings showed that Asian medical students scored lower than NZ European students on measures of social QOL; however, there were no significant differences in self-efficacy, task value and intrinsic goal motivation. In addition, no gender or age effects were noted. Similarly, a study by Artino et al (80) demonstrated no gender effect in relation to task value, and self-efficacy, and course-related anxiety and worry.
In contrast, Kusurkar et al (37) reported a gender effect on motivation and exhaustion among medical students. A higher proportion of male students were in the status-motivated profile (low intrinsic, high extrinsic controlled motivation), whereas a higher proportion of female students were in the interest-motivated profile (high intrinsic, low extrinsic controlled motivation). Female students also scored higher on measures of study-related exhaustion compared with male students.

**Study Question 3: Which specific motivational orientations are associated with enhancing or adversely affecting well-being, and vice versa?**

Five studies investigated the relationship between motivation and well-being. Henning et al (14) noted correlations between self-efficacy, intrinsic value and self-regulation in relation to the physical, environmental, psychological and social QOL of medical students in their clinical years of training. A further study by Henning et al (79) found similar correlations among Asian medical students.

Kusurkar (37) identified a relationship between motivation and exhaustion. Results of this study showed that medical students with both high IM and low extrinsic controlled motivation, had significantly lower exhaustion from study than students with low intrinsic/high extrinsic controlled motivation or low intrinsic/low extrinsic controlled motivation.

Both Park et al (73) and Artino et al (77) identified a relationship between stress and anxiety and motivation. In the study by Park et al, students with higher stress scores scored highest on measures of AM and extrinsic identified regulation, and lowest on measures of IM when compared with students with lower stress scores. In the study by Artino et al, students with higher anxiety scores reported lower levels of self-efficacy motivation in comparison with students with lower anxiety scores.
**Study Question 4: What are the effects of motivation and well-being on medical student academic achievement?**

Five studies investigated the relationship between motivation, well-being and academic achievement. Artino et al (77) conducted a longitudinal study of second-year medical students’ motivational beliefs, achievement emotions and academic performance. This study reported that task value and self-efficacy were positively correlated with student enjoyment and course examination grade, whereas anxiety was negatively correlated with course examination grade.

Similarly, a study by Park et al (73) showed a negative association between stress and academic achievement. In this study, students with high stress scores scored lower on their GPA than students with low stress scores.

Henning et al (14) investigated the associations between QOL, motivation and academic achievement. The findings of this study suggested a positive correlation between students’ academic achievement on written grades and measures of their QOL and motivation. However, there were no associations found between motivation and QOL with achievement in the clinical setting.

Kusurkar et al (37) compared motivational profiles of medical students and showed that medical students with high IM had significantly deeper study strategies, higher self-study hours and higher GPAs than students with high EM or low motivation.

Artino et al (80) investigated the effects of academic achievement on motivation and well-being. This study’s findings suggested that low-achieving students had lower task value and self-efficacy motivation, and greater anxiety, frustration and boredom, when compared with high-achieving students.

In contrast to the previous studies, Del-Ben et al (76) found that academic achievement did not correlate significantly with any measure of academic motivation or well-being in a medical student population. The study indicated that increased
anxiety, decreased academic motivation and a maladjusted leisure/social life had no significant correlations with examination grades among first-year medical students.

**Study Question 5: What are the limitations of current research in this area?**

**Study design**

The nine studies selected for this review were all observational studies; five of the studies used a single group study design (14, 73, 76-78) and four used a comparison group for assessment of outcomes (11, 37, 79, 80). There was a large variety in study sample sizes: the smallest study contained 19 participants (11) and the largest study had 844 (37). Three studies did not report response rate (11, 73, 78).

**Participant sampling and selection bias**

Participant sampling was not reported in studies by Srivastava et al (78) and Park et al (73). A response bias was a potential bias in some studies, especially those with lower response rates, such as the study by Kusurkar et al (37) with a response rate of 44%. No studies reported any prerequisite selection criteria, aside from participants needing to be enrolled in a medical school.

Attrition bias was potentially present in longitudinal studies, as differences between participants who dropped out of the studies or were lost to follow-up were not reported, except in the study by Del-Ben et al (76). In studies utilising comparison groups, baseline differences in known confounders such as age and gender were controlled for during statistical analysis and the results reported appropriately.

**Outcome measurement bias**

All but one study (78) commented on the reliability and validity of the tools used to measure student motivation and well-being. In addition, only Artino et al (77) commented on reliability of the measures of academic achievement. In the study by Henning et al (14), academic achievement was not measured by actual grades of the participating students but instead was measured using estimations of grades
reported by the participants themselves. Therefore, a social desirability bias may be present in this study (81).

Discussion

The findings of this review indicate a relationship between motivation and well-being that can be influenced by demographic and curriculum factors. Furthermore, this review indicates that motivation and well-being can influence academic achievement. However, there was significant heterogeneity in study outcomes, and risks of bias were common in study methodologies.

These findings have implications for student equity and learning. From an equity perspective, medical curricula and training should aim to produce equitable outcomes among medical students. However, the results of this review suggest differences in the experience of psychological distress among female students and ethnic minorities. Similar findings have been observed by Dyrbye et al (12, 82), who previously reported higher levels of psychological distress among female medical students and ethnic minorities. However, not all studies as reported in this review showed similar findings. Furthermore, only one study in this review explored ethnic group differences in motivation and well-being, showing differences in QOL among Asian medical students (79). Further research is needed to explain why motivation and well-being may differ by gender and ethnicity with the view to gaining insight into potential sociocultural influences and differences in the educational experiences among these students during medical school.

From an academic learning perspective, there is evidence of medical student motivation and well-being being undervalued in the development of medical curricula (10, 15). However, consideration of how curricula affect motivation and well-being is important, as the findings of this review suggest changes in motivation and
increasing psychological distress as students progress through a curriculum. Therefore, considerations of how curricula can promote optimal motivation and well-being should be considered as part of a future research agenda and any curriculum reforms.

Of the studies that investigated associations between motivation and well-being, and academic achievement, the evidence presented suggests that there may be an association; however, the low magnitude of the correlations makes it difficult to ascertain the relative level of educational impact. A future research agenda should consider effect sizes and the significance of these associations longitudinally. A qualitative approach may also assist in understanding the underlying mechanisms of why motivation, well-being and academic achievement are associated.

Future research could also consider motivation and well-being not only in the context of medical education, but also studies that exist in other fields. For example, Sheldon & Krieger (83) conducted a study among law students which showed a decline in motivation and well-being over time – similar to medical students. The learnings from this study including the influence of teacher behaviour on student motivation and well-being which may have relevance for medical educators. Thus, literature from other fields could incorporated into future systematic reviews of motivation and well-being.

Given the importance of motivation and well-being for medical education, the number of studies published in this area are scarce and have significant limitations. Firstly, there was considerable heterogeneity in the measures used to determine motivation and well-being among medical students. This diversity is in part a reflection of the range of theories of motivation that are currently present in the literature, including SDT, from which the AMS originates, as well as the MSLQ, which was developed using a social cognitive view of motivation (3, 32, 84). Measures of well-being also
varied significantly: authors elected to measure levels of depression, anxiety, exhaustion, boredom, stress, enjoyment and QOL. This is a limitation when trying to synthesise and compare results from different studies, and as a result, a meta-analysis of study results was unable to be performed.

These limitations also extend to risks of bias throughout the reviewed studies. These risks were heightened by a lack of description of participant selection methods and low participant response rates. The significance of social desirability bias must also be considered a result of self-reporting within many of the reviewed studies. Social desirability bias has been suggested to influence self-reporting of psychological well-being, burnout and academic motivation among students in higher education (85-87). Researchers using self-report questionnaires should consider the effect of socially desirable responding on the validity of their research.

**Conclusion**

This systematic review has summarised and critically appraised current evidence of the relationship between medical student motivation and well-being, the factors that influence motivation and well-being, and their effects on student learning outcomes. The next chapter will elaborate on these findings by qualitatively exploring medical students’ motivations for studying medicine, perceptions of their well-being, and how these may be moderated by curriculum factors and admissions criteria.
CHAPTER 3

Exploring motivation and well-being by year level of a curriculum and admission criteria: A qualitative study
Introduction

The main modes of entry for students into the University of Auckland medical programme (MBChB) is through graduate entry, or the ‘overlapping Year 1’ (OLY1) – a one-year curriculum common to students studying in health-related programmes. Based on a ranking process that includes consideration of OLY1 GPA or GPA of a recognised degree, multiple mini interviews and an aptitude test (the Undergraduate Medical Admission Test – UMAT), the highest ranked students are admitted into the medical programme (88).

An alternative mode of admission for both OLY1 and postgraduate students is through two affirmative admission pathways: the Regional Rural Admission Scheme (RRAS) and the Vision 20:20 programme. The RRAS is a preferential admission scheme for students of regional or rural origin. This scheme aims to ensure equitable access for such students and to address the maldistribution of doctors in New Zealand with too few doctors working in regional and rural areas (89, 90). Evidence shows that students identifying with regional or rural backgrounds are more likely to work outside urban areas (89, 90).

In comparison, the Vision 20:20 programme aims to recruit and retain Māori and Pacific Islander students in tertiary-level health studies to address critical workforce shortages within the NZ health system (91). This programme includes the Māori and Pacific Admission Scheme (MAPAS), which provides preferential entry and academic and pastoral support for students of Māori and Pacific ethnicity entering study in medicine, nursing, pharmacy and the health sciences.

The purpose of this study is to explore medical students’ motivations for studying medicine, perceptions of their well-being and how these may be moderated by curriculum factors and admissions criteria.
Method

Study design
This study was an exploratory qualitative study utilising focus group interviews. Focus groups have been used previously to explore medical student motivation and well-being (11). Focus group methodology offers researchers the opportunity to respond to new ideas or emerging worldviews presented by students during the course of the discussion. In this study, a hybrid approach of inductive and deductive coding and theme development was utilised, as there are established theories of motivation and QOL but there is a scarcity of information about their relationship with ethnic and curriculum factors (3, 12, 36, 54).

Participants and procedures
Ethics approval was granted by the University of Auckland Human Participants Ethics Committee (UAHEPC). Year 2 medical students and Year 5 medical students at the South Auckland Clinical Campus, The University of Auckland, were notified of an opportunity to participate in this focus group study. Year 2 students were notified via email, an online learning portal, and after a lecture or teaching session over a two-week period in October 2013. Year 5 students were notified through their university email over a one-week period in April 2014. All students in Year 2 and Year 5 were selected by both convenience and snowball sampling. Participating students were allocated into focus groups based on their admissions criteria and year level of study. Students who entered medical school through MAPAS were allocated into Year 2 and Year 5 MAPAS focus groups, while students entering through all other pathways (General Admission, Regional Rural Admission and International Admission) were allocated to Year 2 and Year 5 non-MAPAS focus groups.
The Year 2 MAPAS student focus group was conducted at the MAPAS educational centre, a separate cultural space for MAPAS students. The Year 2 non-MAPAS focus group was conducted at the Grafton Campus, a University of Auckland campus that caters for medical and health sciences students. Both Year 5 MAPAS and non-MAPAS focus groups were conducted at the South Auckland Clinical Campus, The University of Auckland. Each focus group was 90 to 120 minutes in duration.

Data were collected through a semi-structured group interview process. The focus group questions used for this process (see Appendix B) were formulated based on WHOQOL factors, which include physical, psychological, social and environmental measures (54). In addition, dimensions of motivation, including IM, EM and AM, were considered in order to focus on students’ academic motivation (32, 35). Therefore, the questions were structured according to preconceived theories, but they were used as a framework rather than a deductive process, as the author was more interested in the semantic process, which is more inductive, using coding and theme development that reflect the explicit content of the data (92).

Focus groups were facilitated by the author and an independent researcher. Consent was obtained for all participants who had read the information sheet that was provided and volunteered to participate. The objectives of the focus group were explained to participants at the beginning of each focus group. Participants then completed the study questionnaire individually, and then a group discussion took place to gain an idea of group consensus. Core activities during the focus group were brainstorming, reflection and exchange of ideas and experiences. During the focus groups, the facilitators encouraged participants to talk freely and to discuss the matters with each other in order to create an open atmosphere, to foster the exchange of individual experiences and thoughts, and to allow questioning and
reconsideration through interaction. All focus group discussions were audiotaped and critical responses were noted.

**Data analysis**

The primary source of data was the focus group transcripts, which were transcribed by an independent research assistant for analysis. The interview transcripts were analysed in NVivo in line with a content analytical approach (93, 94).

To ensure a systematic and rigorous analysis of data, an inductive thematic analysis was employed (92, 95). Firstly, the level of abstraction was determined to identify codes relevant to medical student motivation and QOL. To ensure reliability of the coding system, the author and an independent researcher coded the data. Each line of the transcripts was read and coded, and then the codes were collated into potential themes. Both coders compared their individual codes and themes and resolved discrepancies by reaching consensus. This iterative process aimed to achieve a high level of trustworthiness in the development of the emerging themes.

A final summative check between coders was performed to verify the trustworthiness of the themes. To ensure its accuracy, different data sources, including focus group questionnaires completed by participants, audiotape and the transcribed text, were all examined to build a coherent justification for the categories and themes. Member checking procedures with focus group facilitators and a rich, thick description to convey the research findings were also performed to enhance the accuracy of findings.

**Results**

Twenty undergraduate medical students in Year 2 (n = 15) and Year 5 (n = 5), participated in this study. Students’ transcripts were coded, which were then used to
generate themes about their motivation for studying medicine and their QOL during medical school.

Four themes emerged from the transcripts about their motivation: stimulation, personal values and beliefs, future prospects, and the influence of family. Furthermore, four themes emerged in reference to their QOL: exhaustion and fatigue, sense of purpose and belonging, sacrifice and hardship, and balance. Both their motivation and QOL were found to be influenced by the curriculum and assessment methods, therefore generating an additional theme.

**Motivation**

**Stimulation**

Participants uniformly reported an interest in the sciences and the human body, opportunities for continuous learning, the challenging nature of learning medicine and academic stimulation as reasons for attending medical school.

One participant reported that they hoped “To pursue a career that excited me" while others shared that they "Wanted to do something interesting" and studying medicine would “Fit well with my interests regarding science and health". Other participants reported the challenging nature of studying medicine. One participant discussed how the study of medicine has been “hard work" but the educational process has been rewarding. Another shared similar sentiments, describing medical school as his “biggest challenge yet". Participants were also drawn to the academically stimulating nature of medicine; one participant highlighted that “you won’t get bored; you’re always learning ... because you’re always going to stretch your mind, there’s always more things to know".
Values and beliefs

Participants reported that attending medical school is personally meaningful and congruent with their personal value systems and beliefs. This includes making a difference in people’s lives through service and helping others.

However, differences in responses were noted by admission criteria. It was primarily MAPAS students that discussed their aspirations surrounding wanting to provide support for their whānau (family). This desire developed from MAPAS students’ personal experiences observing family members either requiring or providing healthcare assistance. For example, one participant stated, “Definitely it was a good motivator, like, helping other people. Helping your own whānau, I didn’t really see it much before I started – but I see it more now, how bad the health issues are within the whānau... So that is quite a big motivator for me”.

For many MAPAS students, the beliefs and values in helping others, especially family, also stemmed from culture and upbringing: “In my culture, family is a very important foundation. Growing up in a large family I learnt very quickly about servant leadership as well as caring for others”. Another participant spoke of cultural values – “Values can be tied in with a lot of tikanga (customs) I learnt as a kid. Things such as manākitanga (care for others), aroha (compassion), were well ingrained by older generations. Me having a big whānau also helped develop responsibility towards helping others”.

Non-MAPAS participants also placed an emphasis on helping people based on their own beliefs and values: “My own belief that it is important to earn skills which benefits others”. Another participant discussed, “I wanted to do something to help people – to have a big impact on their lives as a career”.

Another motivating factor, common to both MAPAS and non-MAPAS participants, was the perceived prestige of the medical profession. There was general agreement
among participants that medicine is respected, especially within each of their own respective communities, but the associated benefits were for the sake of others rather than themselves. One participant mentioned, “I don’t find the prestige any personal benefit, but I think it is quite nice to know that because people regard you with prestige, you can do a lot with it. You can be a voice for people”. A similar view was voiced by another participant: “I think that I will have some prestige as a doctor, but I do not want this for personal benefit but more to use this as an avenue to make change or share my, or others’, points of views”.

Family

Both MAPAS and non-MAPAS participants spoke of family influences on their decision to attend medical school because of positive role models and early exposure to the medical profession: “My brother did ‘med’, he is the year ahead of me; seeing other people do it gave me the belief that I could do it”. As a result, participants had opportunities to view and be exposed to life within the medical profession. Such insights influenced students to pursue a career in medicine: “My dad is a ‘GP’ [general practitioner], and my brother is a paediatrician, my mum is a practice nurse ... I saw what they did and I liked it”.

Family members also played a supportive role in participants’ intentions to attend medical school. The majority of participants felt no pressure from family members to attend, but were rather supportive after the fact: “My family is supportive of my choice to go into medicine but did not choose this path for me. Going to medical school is entirely my decision but my family has been behind me every step of the way”.

However, when two participants considered a career outside of medicine, their parents voiced their preferences for medicine: “I developed a real interest in learning languages, and I started to tell my family, oh maybe I might not do medicine; maybe I might do linguistics or something. I got a very kind of soft metaphorical rap on the
hand. Don’t – keep that as a hobby and keep going with medicine”. Another participant discussed, “I also wanted to be a cycle courier. She (mum) wouldn’t let me be a cycle courier, so I had to take something else”.

**Future prospects**

Participants described their thoughts about future prospects after medical school, especially their need for employment and financial security. One participant voiced that by becoming a doctor, “You have always got job security, and you have almost always got a job”. Another participant spoke of “a life and a future where I don’t have to worry about money is very appealing to me”. In contrast, other participants stated that these factors were less important to them: “I think that these kind of thing are nice perks that you may end up with as a doctor or you may not, but they are definitely not things that led me to the decision towards medicine, they weren’t big factors for me”. Similarly, another participant added, “they are not in it for the money ... way more jobs out there for that”.

Participants also voiced the opportunities for a challenging and diverse career. Participants spoke of the “flexibility of the career, where you can go with it, there is no limit to it”. A career in medicine is also perceived as an enabler: “you can go to any country in the world and it is completely translatable”. Along with the flexibility, there is the wide scope for specialisation, including “radiology”, “surgery”, “emergency medicine” and “general practice”.

**Curriculum influences on motivation**

Participants found attending medical school motivating in itself because of the stimulating learning environment, assessments and grades. One participant stated that good grades are a motivation, sharing that “As long as I am passing I am happy although when I get a good grade it helps to motivate me”. A second student stated that bad grades were a motivation, mentioning, “If I achieve a bad grade or review, I
find it difficult to take; but am also very motivated to not let it occur again”. A third participant is motivated by both, explaining, “Whether I get good grades or bad grades, my intention is still to continue and complete med school. Either way they serve as a motivation to continue”. In comparison, neither good grades nor bad grades influence one participant’s motivation: “(Grades) have no influence at all, because learning matters to me more than the grades”.

Three participants spoke of how grades and assignments influenced their perception of their progress, their ability to succeed and their future abilities as doctors: “The better I do in assignments, the more confident I feel in my ability to do well in this degree and as a doctor”. Furthermore, “good grades now prove to myself that I’m setting a good foundation to be a good doctor and confidence for my later career”.

A year-level difference was observed in participants’ experiences of the curriculum. Year 2 participants highlighted how the workload and the volume of assessments influenced their motivation: “The number of lectures can sometimes be off putting, not so much from a stress point of view but more from them getting boring/tiresome with a whole day of them, but this never actually dissuades me, just something that makes it more difficult”. In contrast, two participants spoke of their interest and enjoyment of the content being taught: “Personally I love the content, and that helps me get through it; if I didn’t I would just hate to be here because they just throw so much at us … I think my enjoyment is my main driving force”. Similarly: “I like what I am learning, that is the main thing that keeps me going. I love how the body works … I like what I learn”.

Participants in Year 5, both MAPAS and non-MAPAS, spoke of how the progress test assessments influenced their learning: “I actually found that the progress tests motivate me to learn. Because it’s kind of motivating me to be a good doctor and because I know that at the end of next year I’m going to actually be qualified”. One
participant also spoke of the flexibility of progress test assessments: “I like the flexibility in terms of how you want to learn with this new system. I can choose what I want to learn each week and each month, even each day; and I think I actually am learning more with the progress testing method”.

However, one participant questioned the end outcomes of progress tests: “I still do wonder though if it will make us better doctors”. Another compared progress tests to the old system of assessment: “I was talking to people that just missed the cut-off (for the new system) and they say that some things they had to really, really sit down and spend a lot of time and it’s been quite stressful. I wonder if they probably did work harder than us already in this 5th year”. Similarly, another participant disclosed of progress tests, “one thing I noticed though is your emphasis to study is less and I compare myself to the 5th years last year. I watched them the whole year and near the end of the year they were just stressed out – that is the big OSCE (Objective Structured Clinical Examination) plus ‘writtens’. The progress assessment you just turn up to them and do like a little preparation the day before”. When asked for a positive benefit of progress tests compared with the old system, a participant responded, “I don’t have to study”.

**Quality of life**

*Exhaustion, stress and sleep deprivation*

Exhaustion, stress and sleep deprivation were common complaints among participants. Both Year 2 and Year 5 participants experienced these issues; however, the causes were different among each year level. For Year 2 participants, course workload and assessments were raised as a factor. One participant stated, “*Medicine is an exhausting program. The demands academically are stressful and often overwhelming*”. Other participants reflected on their experiences of assessments: “*you will have a massive test on the Friday, on the Monday you are*
straight back to full schedule lectures again … It always takes me one or two weeks to get back into it, not feeling burnt out from the previous test”; and on grades: “Bad grades really get me down, especially if I have studied hard for my tests. At these times I have very negative thoughts about medicine and reconsider if it’s worth doing”.

For Year 5 students, the clinical learning environment presented its own challenges: “I found generally ever since I started clinical I’ve always been run down in terms of being tired”. One cause identified by participants was the early starts: “My attendance at 8am lectures declined until clinical years, where 8am became compulsory, and that’s when sleep debt became more of an issue”. Clinical assessments and teaching were also mentioned as stressors: “I get very anxious about my performance after our OSCE or after certain assessments; I’m really unsure about what feedback I’m going to get or what implication it’s going to have for me. You know, 99% of the time it ends up to be fine, but it’s that uncertainty that I find difficult to deal with”; and in relation to teaching: “I often feel like we’re a burden on those that are teaching us and that makes me feel awkward and anxious sometimes about turning up”.

As a result, participants responded to exhaustion and stress in a variety of ways. One participant in Year 2 chose not to attend lectures: “I’ve missed more classes this year than ever before because I’m too tired or because I need to spend time with my family to get ‘a bit of fresh air’ (and break from med school)”. Another participant took a break from studying: “Yeah, I didn’t do any study … but I still felt guilty for not studying. It plays on your mind”. Another participant sought to maintain a balanced lifestyle: “Learning about when you can actually take a break, getting good sleeps and better exercise – not just pizza”. Another participant’s perception of medical school changed: “Sometimes the volume of stress can make me hate coming to med
school and makes me lack motivation”. Other participants sought support from family and friends.

Sacrifice

Participants reflected on the sacrifices they have made to study medicine, and the impact on their families and social relationships. One participant spoke of the sacrifice: “The impact it has on my family – for example, not being with them as much as I would like”. For many, there was less time for social relationships and activities outside of medical school. One participant noted, “you do have to give up things or reprioritise because it does become a big challenge”. Another participant commented, “I had to give up rugby this year, hopefully I will play next year. I don’t think I would have got through this year as well as I have, had I continued playing rugby”. Similarly: “I love music, I used to practise every day and take lessons – which I do on a much smaller scale now”.

A participant also spoke of the sacrifice that the participant believes is needed to achieve good grades: “The effort to get an excellent grade, you have got to basically stuff your life, stay in the library. Cause I study reasonably hard sometimes to get up to that excellent grade, you have to pretty much give up your life, I’d rather not”.

Furthermore, the financial sacrifice for medical school was highlighted among participants: “A lot of my friends are out working and making money while I’m on ‘Studylink’ (student loan)”. This discussion extended to student debt: “I have just like a massive debt ... I don’t think about it – just in denial”.

Sense of purpose and belonging

Participants reflected on how medical school positively impacts on QOL by providing a sense of purpose and belonging. One participant elaborated – “I think medicine has improved my quality of life, you know where you are going to end up, you have direction, you know you are going to be in the medical field. I find that I have a box
that is ticked now, a career box, and now I can just focus on other things. It has given me a future direction”.

Participants reported that belonging to a peer group provided a source of support and a sense of belonging. For Year 2 students, support came from their peers and classmates and being “part of a community of cool and driven people”. One participant commented that, “For me, one of the best things is the classmates…we are all going somewhere together and we all want to learn a lot of stuff, and we all help each other out”. For these Year 5 students, the peer group included the clinical team who also provided a sense of purpose – “I think that some of the best experiences are when you are involved longitudinally with a team because you start to see more what the career you could be working in”. For these MAPAS students, the peer group included the wider MAPAS cohort – “It is good having support from your friends, in terms of MAPAS specifically, the whole MAPAS cohort second year is a really tight group”.

Balancing quality of life

Although participants discussed experiences of medical school that negatively affected QOL, for many, QOL was maintained through positive experiences and the support from friends and family. One participant stated, “I love med school even though it makes me feel a huge range of emotions and amount of stress”. Another participant spoke of the “peaks and troughs … getting to feel stressed and then awesome”. Similarly, other participants discussed how medical school “is a mixed bag really. It eats heavily into my spare time but gives my life meaning in many ways. It’s hard, but the people (my friends) that I’m surrounded with usually help me through (and vice versa). My support network and family keep me motivated so quality of life is balanced out, I think”.

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Discussion

This study has explored the views of a group of medical students in reference to their underlying motivations for studying medicine, perceptions of their QOL and how they are moderated by medical curriculum factors. While previous studies have explored each in isolation, taken as a whole, these findings suggest an interplay with the medical curriculum both supporting and thwarting student motivation and QOL.

When considered in the context of SDT, the findings of this study show the continuum of motivation can be applied to learning at medical school (3). On one hand, motivation is mostly intrinsic and autonomous, that is, out of interest, challenge or opportunities for learning and enjoyment and because of personal values and beliefs such as service and helping others. On the other hand, motivation is extrinsic and controlled – out of concern for future financial prospects and job security.

These findings are in line with a study by Vaglum et al (1), who suggested that medical student motivations are autonomous, based on a natural science and person orientation, and controlled, based on a status and security orientation. This study adds to these findings by identifying the underlying sociodemographic factors that are influencing motivation for studying medicine. Factors such as the whānau, exposure to role models, and cultural values and beliefs were all identified as playing a role, particularly among MAPAS medical students.

These results have also identified themes about QOL, which is considered a multidimensional construct (54). When applied within the WHOQOL framework, the themes identified in this study are consistent with physical, psychological, social and environmental QOL dimensions (54). Similarly to findings by Henning et al (11), issues of physical and psychological QOL were identified, such as exhaustion and sleep deprivation, and anxiety and uncertainty in a clinical setting. However, this study builds on findings from Henning and colleagues by identifying course workload
and assessment stressors as additional factors affecting student QOL in the pre-clinical setting.

This study has also identified having a sense of purpose and belonging to a wider peer group, physical activity, support from family, and avoidance of study and classes as coping mechanisms to contribute to physical, psychological and social QOL. However, a concerning finding was students framing their life experiences in terms of poor QOL, by perceiving these experiences as necessary and inherent in their journey to becoming doctors.

In line with SDT, these findings also show how both motivation and QOL have been supported or thwarted by the curriculum. More autonomous forms of motivation are supported when the curriculum promotes learner autonomy (33). This was demonstrated in this study by participants’ experiences of progress testing, which enabled flexibility in the approach to learning as well as choice over when and what to learn, thereby supporting their autonomy.

When the curriculum promotes learners’ competence and self-efficacy, motivation and QOL are also supported (33). This was demonstrated by participants’ descriptions of achieving good grades which increased both their sense of competence, and their experiences of positive emotions. Conversely, their perceptions of their own competence were reduced when receiving bad grades, leading to negative emotions and thoughts of discontinuing medical school.

**Conclusion**

The student voice differed when expressing thoughts about motivation and QOL. Clear differences in students’ expression were noted between year level and admissions criteria. Furthermore, the students’ commentaries in this sample suggested that the curriculum was a mediator of motivation and QOL during their
medical school experience. The next chapter will consider how motivation and QOL changes longitudinally during the course of the medical programme.
CHAPTER 4

A longitudinal study of motivation and well-being across year levels of a curriculum
Introduction

The previous chapter identified student motivations for studying medicine, their well-being, and how these may be moderated by the curriculum, year level and admissions criteria. This chapter builds on these findings by considering these factors longitudinally.

The need for a deeper understanding of medical students’ academic motivation and well-being has been emphasised previously (12, 36, 76). However, research on the personal and training-related features that influence both are scarce. The majority of studies conducted in this area have employed a cross-sectional design, and therefore, minimal longitudinal information is available (12, 14, 37, 40).

The information that is available is limited to small sample sizes, and short follow-up periods (12, 76). For example, Del-Ben et al (76) measured academic motivation, anxiety, depression and social adjustment longitudinally. However, the study involved 85 students during the first year of medical school. Similarly, longitudinal studies of medical student depression and anxiety have tended to focus primarily on changes during the first year of medical school (12). Two other studies have measured burnout longitudinally; however, minimal longitudinal information is available on medical students’ QOL (96, 97).

Therefore, the aim of this study was to address a current gap in the literature by investigating longitudinal differences in academic motivation, burnout and QOL across year levels of a curriculum.
Method

Subjects and procedures

As noted above, the University of Auckland has a six-year undergraduate programme consisting of three years of predominantly basic sciences followed by three clinically oriented years. This study included students in Year 2 through to Year 5 of the medical programme. The protocol involved two cohorts of medical students at the University of Auckland; the first cohort (n = 641) was surveyed in September 2012, and the second cohort (n = 242) was surveyed in July 2013. Each student (n = 883) was followed up over at least two further time points: in July 2013 and July 2014 respectively. A subgroup of students (N = 242) in this study who were in Year 2 of the medical programme were followed up at additional time points: on the first day of the academic year, in March 2013, and then halfway through the academic year, in July 2013.

At the end of a lecture, students were distributed the study questionnaire (Motivation for Learning and Well-being Questionnaire) (Appendix 1), which is a self-report Likert-type questionnaire composed of validated measures of academic motivation and QOL (17-20). Contained within the questionnaire was the AMS, which measured IM, EM and AM, and subscales of the MSLQ, which measured self-efficacy and test anxiety (32, 84). The AMS and MSLQ have been previously used in medical education research both internationally and in New Zealand (14, 40). In a study by Mitchell (98) the construct validity of the AMS has also been investigated among a University of Auckland medical student population (98). In this study, both an exploratory factor analysis and then a confirmatory factor analysis of the AMS was completed. The results of these analyses suggested the AMS was appropriate for the assessment of motivation among medical students at The University of Auckland.
Consistent with studies by Kusurkar et al (37), the author modified the AMS, which was originally designed for college and university students, so that it could be applied to medical students and further checked the reliability of each scale. IM scores were calculated from the AMS as an average of the IM scores on the three subscales (37). EM scores were calculated by taking an average of introjected regulation and external regulation scores (37). The identified regulation subscale was not included within calculations and subsequent data analysis as the items on this subscale are such that most students in professional education would answer positively (37). Therefore, this subscale is not likely to discriminate between motivational orientations within a medical student population (99).

The questionnaire also contained the WHOQOL-BREF, and the ‘personal burnout’ scale from the CBI to measure QOL and burnout respectively (54, 67). Both the WHOQOL-BREF and the CBI have been used in a number of QOL and burnout studies during medical training, and the WHOQOL-BREF has been validated among a University of Auckland medical student population (14, 69, 71).

The WHOQOL-BREF questionnaire included 24 items that encompass four QOL domains (physical health, psychological health, social relationships and environmental conditions). The scores for each domain were calculated using a well-recognised WHOQOL-BREF syntax (100). The personal burnout subscale of the CBI contains six items with scoring from 0–100 for each item. The total score on the scale was the mean of the scores on the items (67).

In addition, the study questionnaire also contained a demographic survey (age, gender), and admission criteria into medical school (General Admission, MAPAS, RRAI).
Each questionnaire was coded by requesting student University identification numbers so that each questionnaire could be matched to individual students over time.

**Statistical analyses and ethics approval**

All statistical analyses were performed using IBM SPSS 22.0 or SAS. P values less than 0.05 were considered statistically significant. All tests were two-tailed. Written informed consent to participate was obtained from all students and ethics approval was obtained from the UAHEPC.

Firstly, the mean response rates for survey completion were computed. Next, internal reliability measures for each section of the questionnaire were evaluated by Cronbach’s alpha coefficients. Chi-square analyses were conducted to determine any significant demographic differences between cohorts of medical students.

Two main analyses were conducted. The first analysis aimed to inspect motivational and QOL changes across the year groups from Year 2 to Year 5. The second analysis was a scoping exercise that drilled down into the experiences of a single year group, namely, Year 2.

In the first analysis, a mixed-effect analysis of variance (ANOVA) was used to determine longitudinal changes in academic motivation, personal burnout and QOL between academic years. A mixed-effect ANOVA was used as it can compare both between group and repeated-measures variables within the same mixed-effect model (101).

For the purposes of this analysis, Year level of the curriculum was included in the mixed-effect model with other fixed effect covariates: type of curriculum, age, gender, and admission criteria (general admission, MAPAS, RRAS). Those admitted as international students were excluded from the model because of low numbers of
these students over time, and the wide-ranging or unknown backgrounds associated with this group.

Random intercept terms were assigned for subjects and the Toeplitz covariance structure of the intra-subject variance was selected as the best choice to estimate the intra-subject variations. From this model, the least square means (LSMs) of year level and admission criteria are reported in the results section of this chapter. LSMs are also reported in subsequent chapters of this thesis. The rationale for using LSMs rather than arithmetic means is because of an unbalanced design due to more than one effect in the model. Therefore, LSMs provide a more accurate estimate of a group’s response than arithmetic means as it considers all of the other effects in the model (102).

In the second analysis, a subgroup analysis using a one-way repeated measures ANOVA was also conducted to evaluate changes in academic motivation, burnout and QOL scores at two time points during the Year 2 academic year.

Results

Response rate

The number of times that participants completed each of the surveys is reported in Figure 4.1 and Table 4.1. The frequency and response rate to each survey is reported in Table 4.2. A total of 725 students have completed at least one of the three surveys (Table 4.1). In total, 1269 surveys were completed.

For the first survey, 883 students were approached, and 522 completed the survey, which yields a response rate of 59%. Of the 875 students who were approached for the second follow-up survey, 422 (48%) completed it, and of the 435 students for the third follow-up survey, 324 (74%) completed it. A total of 126 (17%) students completed all three follow-up survey
Figure 4.1 Number of times that participants completed each of the surveys over time

Table 4.1 Number of times that participants completed each of the surveys over time

<table>
<thead>
<tr>
<th>Superscript</th>
<th>Response between waves</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Only responded in wave 1</td>
<td>150</td>
<td>21</td>
</tr>
<tr>
<td>#2</td>
<td>Only responded in 2</td>
<td>83</td>
<td>12</td>
</tr>
<tr>
<td>#3</td>
<td>Only responded in wave 3</td>
<td>75</td>
<td>10</td>
</tr>
<tr>
<td>#4</td>
<td>Responded in wave 1 and wave 2</td>
<td>168</td>
<td>23</td>
</tr>
<tr>
<td>#5</td>
<td>Responded in wave 2 and wave 3</td>
<td>45</td>
<td>6</td>
</tr>
<tr>
<td>#6</td>
<td>Responded in wave 1 and wave 3</td>
<td>78</td>
<td>11</td>
</tr>
<tr>
<td>#7</td>
<td>Responded in wave 1, 2, and 3</td>
<td>126</td>
<td>17</td>
</tr>
</tbody>
</table>

Table 4.2 Proportion of participants who completed each of the study surveys

<table>
<thead>
<tr>
<th>Survey Completion</th>
<th>Frequency of Survey Completion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion of first survey (Wave 1)</td>
<td>522/883 (59)</td>
</tr>
<tr>
<td>Completion of second survey (Wave 2)</td>
<td>422/875 (48)</td>
</tr>
<tr>
<td>Completion of third survey (Wave 3)</td>
<td>325/435 (74)</td>
</tr>
</tbody>
</table>
Representativeness of study population

The proportion of respondents within each admission scheme is outlined in Table 4.3. Such information can be used to compare respondents with potential respondents to determine if respondents remain representative of the study population over time (103). The proportion of General Admission respondents was 61%, 57% and 58% from wave 1 to wave 3 respectively which is very similar to the proportion of potential respondents of 61% (K. Snow, registry data, personal communication, 12 July 2016). Furthermore, there was a similar proportion of MAPAS respondents to potential MAPAS respondents. The proportion of MAPAS respondents was 20%, 22% and 20% from wave 1 to wave 3 respectively which compares favourably with the proportion of potential MAPAS respondents of 20%. The proportion of regional rural admissions was 13%, 14%, and 15% from wave 1 to wave 3 respectively. The proportion of regional rural students in the population, and therefore, potential respondents, was 11%. Finally, the percentage of international admission respondents was 6%, 7%, and 7% from wave 1 to wave 3 respectively. The proportion of potential respondents from the International Admission population was 8%.
Table 4.3 Proportion of participants who completed each of the study surveys by admission scheme

<table>
<thead>
<tr>
<th>Survey Completion</th>
<th>General Admission</th>
<th>Maori &amp; Pacific Admission</th>
<th>Regional Rural Admission</th>
<th>International Admission</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 1 no. (%)</td>
<td>318 (61)</td>
<td>102 (20)</td>
<td>69 (13)</td>
<td>33 (6)</td>
<td>522</td>
</tr>
<tr>
<td>Wave 2 no. (%)</td>
<td>239 (57)</td>
<td>90 (22)</td>
<td>58 (14)</td>
<td>31 (7)</td>
<td>418</td>
</tr>
<tr>
<td>Wave 3 no. (%)</td>
<td>186 (58)</td>
<td>63 (20)</td>
<td>50 (15)</td>
<td>24 (7)</td>
<td>325</td>
</tr>
<tr>
<td>Total</td>
<td>743</td>
<td>255</td>
<td>177</td>
<td>88</td>
<td>1263</td>
</tr>
</tbody>
</table>

The proportion of male and female respondents is outlined in Table 4.4. The proportion of male respondents was 49%, 43% and 45% from wave 1 to wave 3 respectively. In comparison, the proportion of potential respondents who were male was 50% (K. Snow, registry data, personal communication, 12 July 2016). The proportion of female respondents, was 51%, 57%, and 55% respectively which compares with the proportion of potential female respondents of 61%. Therefore, male students were slightly underrepresented in the study population while female students were slightly overrepresented in the study population.

Table 4.4 Proportion of male and female participants who completed each of the study surveys

<table>
<thead>
<tr>
<th>Survey Completion</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 1 no. (%)</td>
<td>254 (49)</td>
<td>268 (51)</td>
<td>522</td>
</tr>
<tr>
<td>Wave 2 no. (%)</td>
<td>181 (43)</td>
<td>241 (57)</td>
<td>422</td>
</tr>
<tr>
<td>Wave 3 no. (%)</td>
<td>144 (45)</td>
<td>179 (55)</td>
<td>323</td>
</tr>
<tr>
<td>Total</td>
<td>579</td>
<td>688</td>
<td>1269</td>
</tr>
</tbody>
</table>

Motivation changes between year levels

The results of the mixed-model ANOVA indicated statistically significant differences in AM, EM, test anxiety and self-efficacy scores between baseline (Year 2) and
ascending year levels (Error! Reference source not found.). Year 4 and Year 5 had higher AM and EM scores than Year 2. In comparison, all other year levels had higher self-efficacy mean scores compared with Year 2. Although Year 2 had a higher mean test anxiety score than Year 3, there were no differences when compared with Year 4 and 5. There were also no differences in IM scores between Year 2 and other year levels.

Table 4.5 Academic motivation least square mean (LSM) scores and standard errors (SE) for students in Year 2 to Year 5 of the medical programme

<table>
<thead>
<tr>
<th>Academic Motivation</th>
<th>Year 2 LSM* (SE)</th>
<th>Year 3 LSM* (SE)</th>
<th>Year 4 LSM* (SE)</th>
<th>Year 5 LSM* (SE)</th>
<th>P Value**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=422</td>
<td>N=271</td>
<td>N=320</td>
<td>N=262</td>
<td></td>
</tr>
<tr>
<td>Amotivation*</td>
<td>1.2 (.04)</td>
<td>1.2 (.04)</td>
<td>1.4 (.04)</td>
<td>1.4 (.05)</td>
<td>.003</td>
</tr>
<tr>
<td>Intrinsic*</td>
<td>3.6 (.04)</td>
<td>3.5 (.04)</td>
<td>3.5 (.05)</td>
<td>3.5 (.05)</td>
<td>.19</td>
</tr>
<tr>
<td>Extrinsic*</td>
<td>2.9 (.06)</td>
<td>2.9 (.06)</td>
<td>3.1 (.06)</td>
<td>3.1 (.07)</td>
<td>.03</td>
</tr>
<tr>
<td>Self-efficacy*</td>
<td>3.4 (.05)</td>
<td>3.5 (.05)</td>
<td>3.5 (.05)</td>
<td>3.5 (.05)</td>
<td>.003</td>
</tr>
<tr>
<td>Test anxiety*</td>
<td>3.1 (.07)</td>
<td>2.9 (.07)</td>
<td>2.9 (.07)</td>
<td>3.0 (.08)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5
* Measured by the MSLQ; range of scores = 1 to 5
* The reporting least square means (LSMs) are adjusted for admission, age, gender and curriculum type
** The p values are results of the F-Test in the mixed-effect model
***N indicates the total number of questionnaires completed within each year level

Motivation change over time

There was a significant time effect reflected by changes in AM, EM, test anxiety and SE observed by ascending year levels. AM scores did not change between Year 2 and Year 3, but increased between Year 3 and Year 4 (mean difference of 0.2 (0.04)). In comparison, mean EM scores were lower among Year 2 and 3 and then increased between Year 3 and Year 4 (mean difference of 0.2 (0.06)). Furthermore, self-efficacy scores increased between Year 2 and Year 3 (mean difference of 0.1 (0.05)) but then did not change from Year 3 onward. In contrast, mean test anxiety scores were lower in Year 3 than Year 2 (mean difference of 0.2 (0.07)) and then
increased between Year 3 and Year 5 (mean difference of 0.1 (0.07)). However, IM scores were unchanged over sampling times.

**Burnout and QOL changes between year levels**

A significant difference in QOL and burnout was found between baseline (Year 2) and ascending year levels (Table 4.6). Year 3, Year 4 and Year 5 had higher physical, psychological and social QOL scores than Year 2. Year 3 and Year 5 also had higher environmental QOL scores and lower burnout scores than Year 2; however, no significant differences were found between Year 2 and Year 4 in these domains.

**Table 4.6 Burnout and QOL least square mean (LSM) scores and standard errors (SE) for students in Year 2 to Year 5 of the medical programme**

<table>
<thead>
<tr>
<th>Quality of Life and Burnout</th>
<th>Year 2 LSM* (SE) <strong>N=422</strong></th>
<th>Year 3 LSM* (SE) <strong>N=271</strong></th>
<th>Year 4 LSM* (SE) <strong>N=320</strong></th>
<th>Year 5 LSM* (SE) <strong>N=262</strong></th>
<th>P Value**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Burnout*</td>
<td>40.1 (1.0)</td>
<td>38.6 (0.9)</td>
<td>39.3 (1.2)</td>
<td>37.1 (1.4)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Physical QOL*</td>
<td>15.2 (0.1)</td>
<td>15.8 (0.1)</td>
<td>16.1 (0.1)</td>
<td>16.4 (0.1)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Psychological QOL*</td>
<td>14.5 (0.1)</td>
<td>14.8 (0.1)</td>
<td>15.0 (0.2)</td>
<td>14.9 (0.2)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Social QOL*</td>
<td>14.8 (0.2)</td>
<td>15.3 (0.2)</td>
<td>15.7 (0.2)</td>
<td>15.9 (0.2)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Environmental QOL*</td>
<td>15.2 (0.1)</td>
<td>15.5 (0.1)</td>
<td>15.4 (0.2)</td>
<td>15.9 (0.2)</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

* Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0.0 to 100.0

* Measured by the WHOQOL-BREF; range of scores = 4.0–20.0

* The reporting least square means (LSMs) are adjusted for admission, age, gender and curriculum type

** The p values are results of the F-Test in the mixed-effect model

***N indicates the total number of questionnaires completed within each year level

**Burnout and QOL changes over time**

There was a significant time effect reflected by changes in burnout and QOL scores over ascending year levels. As year level increased from Year 2 to Year 5, physical and social QOL scores increased while burnout scores declined. Environmental QOL scores also increased between Year 2 and Year 3 (mean difference of 0.3 (0.1)) and Year 4 to Year 5 (mean difference of 0.5 (0.2)); however, there was a decline in scores between Year 3 and Year 4 with a mean difference in score of 0.1 (0.1). In comparison, psychological QOL increased between Year 2 and Year 3 (mean
difference of 0.3 (0.1) and Year 3 and Year 4 (mean difference of 0.2 (.1)); however, there was a decline in scores between Year 4 and Year 5 (mean difference of 0.1 (0.2).

**Subgroup analysis of Year 2**

As a result of the significant differences observed between Year 2 and other year levels, a subgroup analysis was conducted to evaluate potential changes in motivation, burnout and QOL during the Year 2 academic year. A total of 108 students (response rate of 45%) completed the study questionnaire at two time points: the beginning of the academic year and halfway through the academic year. The results of the repeated measures ANOVA indicated a significant time effect for EM, self-efficacy, physical and psychological QOL, and personal burnout (Table 4.5). There was a significant increase in EM, AM and personal burnout scores over time, with mean differences of 0.2 (0.1), 0.2 (0.1) and 6.5 (1.2) respectively.

Conversely, there was a decline in self-efficacy scores between the two time periods, with a mean difference of 3.4 (0.1). Similarly, the mean scores for physical QOL and psychological QOL declined, with a mean difference of 0.66 (0.2) and 1.1 (0.2) respectively.

Table 4.7 Mean motivation scores at the beginning and middle of the Year 2 academic year

<table>
<thead>
<tr>
<th>Academic Motivation</th>
<th>Beginning of Academic Year LSM (SE)</th>
<th>Middle of Academic Year LSM (SE)</th>
<th>P Value**</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic*</td>
<td>3.6 (0.1)</td>
<td>3.6 (0.1)</td>
<td>.282</td>
<td>0.011</td>
</tr>
<tr>
<td>Extrinsic*</td>
<td>2.7 (0.1)</td>
<td>2.9 (0.1)</td>
<td>&lt;.001</td>
<td>0.119</td>
</tr>
<tr>
<td>Self-efficacyX</td>
<td>3.4 (0.1)</td>
<td>3.2 (0.1)</td>
<td>&lt;.001</td>
<td>0.094</td>
</tr>
<tr>
<td>Test anxiety</td>
<td>3.0 (0.1)</td>
<td>3.1 (0.1)</td>
<td>.217</td>
<td>0.014</td>
</tr>
<tr>
<td>Amotivation</td>
<td>1.2 (0.6)</td>
<td>1.3 (0.6)</td>
<td>.013</td>
<td>0.109</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5
X Measured by the MSLQ; range of scores = 1 to 5
** P values from repeated measures ANOVA
Table 4.8 Burnout and QOL mean scores at the beginning and middle of the Year 2 academic year

<table>
<thead>
<tr>
<th>Quality of Life and Burnout LSM (SE)</th>
<th>Beginning of Academic Year</th>
<th>Middle of Academic Year</th>
<th>P Value*</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Burnout(^*)</td>
<td>35.8 (1.3)</td>
<td>42.4 (1.5)</td>
<td>&lt;.001</td>
<td>0.217</td>
</tr>
<tr>
<td>Physical QOL(^\wedge)</td>
<td>15.8 (0.2)</td>
<td>15.1 (0.2)</td>
<td>&lt;.001</td>
<td>0.149</td>
</tr>
<tr>
<td>Psychological QOL(^\wedge)</td>
<td>14.9 (0.2)</td>
<td>13.8 (0.2)</td>
<td>&lt;.001</td>
<td>0.254</td>
</tr>
<tr>
<td>Social QOL(^\wedge)</td>
<td>14.7 (0.2)</td>
<td>14.2 (0.3)</td>
<td>.051</td>
<td>0.035</td>
</tr>
<tr>
<td>Environmental QOL(^\wedge)</td>
<td>14.8 (0.2)</td>
<td>14.7 (0.2)</td>
<td>.54</td>
<td>0.003</td>
</tr>
</tbody>
</table>

* Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0.0 to 100
\(^\wedge\) Measured by the WHOQOL-BREF; range of scores = 4.0–20

**Subgroup analysis by admissions criteria**

**Motivation**

There were significant associations between admission criteria, with EM and test anxiety (Table 4.9). Pairwise comparisons (Table 4.10) showed students admitted under Regional Rural Admission and MAPAS had higher mean test anxiety scores than students admitted under General Admission. Furthermore, students admitted under MAPAS also had higher EM scores than General Admission and Regional Rural Admission students. These trends were consistent across year levels, as demonstrated by the absence of significant interaction effects between admission criteria, year level and motivation constructs.
Table 4.9 Academic motivation least square mean (LSM) scores and standard errors (SE) by admission criteria

<table>
<thead>
<tr>
<th>Academic Motivation</th>
<th>General Admission LSM (SE) N=743</th>
<th>MAPAS Admission LSM (SE) N=255</th>
<th>Regional Rural Admission LSM (SE) N=177</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amotivation</td>
<td>1.3 (0.03)</td>
<td>1.2 (0.05)</td>
<td>1.3 (0.06)</td>
<td>.37</td>
</tr>
<tr>
<td>Intrinsic*</td>
<td>3.5 (0.03)</td>
<td>3.5 (0.06)</td>
<td>3.5 (0.07)</td>
<td>.90</td>
</tr>
<tr>
<td>Extrinsic+</td>
<td>2.9 (0.05)</td>
<td>3.2 (0.09)</td>
<td>2.8 (0.10)</td>
<td>.005</td>
</tr>
<tr>
<td>Self-efficacy*</td>
<td>3.5 (0.04)</td>
<td>3.4 (0.06)</td>
<td>3.6 (0.07)</td>
<td>.10</td>
</tr>
<tr>
<td>Test anxiety</td>
<td>2.7 (0.05)</td>
<td>3.2 (0.09)</td>
<td>3.1 (0.11)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5
\* Measured by the MSLQ; range of scores = 1 to 5
** The reporting least square means (LSMs) are adjusted for admission, age, year level, gender and curriculum (see Appendix 1 for table of covariates).
***N indicates the total number of questionnaires completed by students within each admission scheme.

Table 4.10 Post hoc comparisons of academic motivation between admissions criteria only, including significant dimensions of the domain

<table>
<thead>
<tr>
<th>Academic Motivation</th>
<th>Comparisons</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic</td>
<td>MAPAS vs General Admission</td>
<td>0.3</td>
<td>0.1</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>MAPAS vs Rural</td>
<td>0.4</td>
<td>0.1</td>
<td>.003</td>
</tr>
<tr>
<td>Test anxiety</td>
<td>MAPAS vs General Admission</td>
<td>0.5</td>
<td>0.1</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>Rural Admission vs General Admission</td>
<td>0.5</td>
<td>0.2</td>
<td>.03</td>
</tr>
</tbody>
</table>

Based on estimated marginal means
* The mean difference is significant at the .05 level
+ Adjustment for multiple comparisons: Bonferroni

**Burnout and QOL**

There were also significant associations between admission criteria with respect to burnout and QOL (Table 4.11). Pairwise comparisons indicated MAPAS students had a higher mean burnout score than students admitted under General and Regional Rural Admission criteria (Table 4.12). In addition, MAPAS and Regional Rural Admissions had higher social QOL mean scores than General Admissions respectively. However, General Admissions and Regional Rural Admissions had higher environmental QOL mean scores than MAPAS. These trends were consistent
across year levels as demonstrated by the absence of significant interaction effects between admissions criteria, year level, burnout and QOL dimensions.

Table 4.11 Burnout and QOL least square mean (LSM) scores and standard errors (SE) by admission criteria

<table>
<thead>
<tr>
<th>Quality of Life and Burnout</th>
<th>General Admission LSM (SE)</th>
<th>MAPAS Admission LSM (SE)</th>
<th>Regional Rural Admission LSM (SE)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal burnout*</td>
<td>36.0 (0.9)</td>
<td>40.7 (1.4)</td>
<td>39.6 (1.7)</td>
<td>.0001</td>
</tr>
<tr>
<td>Physical QOL^</td>
<td>16.1 (0.1)</td>
<td>14.9 (0.2)</td>
<td>16.6 (0.2)</td>
<td>.0002</td>
</tr>
<tr>
<td>Psychological QOL^</td>
<td>14.7 (0.1)</td>
<td>14.7 (0.2)</td>
<td>15.0 (0.2)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Social QOL^</td>
<td>14.8 (0.2)</td>
<td>15.7 (0.3)</td>
<td>15.8 (0.3)</td>
<td>0.0008</td>
</tr>
<tr>
<td>Environmental QOL^</td>
<td>15.5 (0.1)</td>
<td>14.7 (0.2)</td>
<td>16.3 (0.2)</td>
<td>.002</td>
</tr>
</tbody>
</table>

* Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0.0 to 100
^ Measured by the WHOQOL-BREF; range of scores = 4.0–20
** The reporting least square means (LSMs) are adjusted for admission, age, year level, gender and curriculum (see Appendix 1 for table of covariates). In some domains, it also adjusted for the significant two-way interactions.

Table 4.12 Post hoc comparisons of burnout and QOL between admissions criteria only, including significant dimensions of the domain

<table>
<thead>
<tr>
<th>Quality of Life and Burnout</th>
<th>Comparisons</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Burnout**</td>
<td>MAPAS vs General Admission</td>
<td>4.7</td>
<td>1.5</td>
<td>.016</td>
</tr>
<tr>
<td></td>
<td>MAPAS vs Regional Rural Admission</td>
<td>3.7</td>
<td>1.9</td>
<td>.05</td>
</tr>
<tr>
<td>Physical QOL^</td>
<td>MAPAS vs General Admission</td>
<td>-1.1</td>
<td>0.2</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>Regional rural vs General Admission</td>
<td>0.5</td>
<td>0.2</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>MAPAS vs Regional Rural Admission</td>
<td>-1.7</td>
<td>0.2</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Social QOL^</td>
<td>MAPAS vs General Admission</td>
<td>0.9</td>
<td>0.3</td>
<td>.006</td>
</tr>
<tr>
<td></td>
<td>Rural vs General Admission</td>
<td>1.0</td>
<td>0.3</td>
<td>.009</td>
</tr>
<tr>
<td>Environmental QOL^</td>
<td>MAPAS vs General Admission</td>
<td>-1.0</td>
<td>0.2</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>Regional rural vs General Admission</td>
<td>0.7</td>
<td>0.2</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>MAPAS vs Regional rural Admission</td>
<td>-1.7</td>
<td>0.3</td>
<td>.003</td>
</tr>
</tbody>
</table>

Based on estimated marginal means
* The mean difference is significant at the .05 level
+ Adjustment for multiple comparisons: Bonferroni
** Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0.0 to 100
^ Measured by the WHOQOL-BREF; range of scores = 4.0–20
Discussion

The aim of the present research was to explore the interactions of academic motivation, burnout and QOL with year level of a curriculum and admissions criteria and to appraise the stability of these over time. The findings from this study showed a number of trends. Firstly, a significant year level effect was observed; with small but significant differences in motivation, burnout and QOL reported between Year 2 and other levels. Secondly, changes in motivational orientation towards extrinsic goals, an increase in burnout, and a decline in self-efficacy and QOL were observed during the Year 2 academic year. Thirdly, there was a significant time effect reflected by changes in motivation, burnout and QOL scores over ascending year levels. Moreover, there were significant differences between admissions criteria that were consistent across year levels. Taken together, these findings suggest that the time during medical school has a differential effect on motivation, burnout and QOL, especially for students in their first year of medical school, and for those who enter through alternative admission pathways.

Differences between year levels

One of the most striking outcomes was the higher burnout and lower QOL scores among students in their first year of medical school (‘Year 2’ within the University of Auckland medical programme) when compared with all other year levels. Consistent with these findings, Dyrbye et al (51), Miller (104) and Del-Ben et al (76) have drawn attention to psychological distress and the decline in QOL during the first year of medical school. As detailed by Dyrbye et al, 37% of first-year students surveyed met the criteria for burnout, while Miller (104) found 25% of students reported symptoms of depression and anxiety between the beginning of the academic year and follow-up six months later. An increase in anxiety symptoms and a maladjusted leisure and social life at follow-up 12 months later was also seen by Del-Ben (76). The
consistency of these findings with the results from this study serve to highlight the difficulty and challenges faced by students in the early stages of medical school.

The qualitative findings from Chapter 2 identified the substantial scholastic workload and concern for academic performance as two of the key challenges. Similar results were observed by Coles (105) and Miller (104), who identified course workload and fear of failure as common sources of stress for first-year medical students.

In addition to the differences in burnout and QOL, differences in motivation were also found between year levels. Assessment of changes during Year 2 showed a small but significant increase in EM and a decline in self-efficacy. It is known that motivational orientation towards intrinsic or extrinsic goals is associated with students’ perception of their capability for learning, and the meaning and value of the educational experience (3). It is proposed that EM increased as a result of a loss of self-efficacy, concern for academic performance and lack of meaning and value of the educational experience, although more research is required to confirm this hypothesis. Furthermore, the curriculum of the early years of medical school often deals primarily with concepts that are not directly or clearly related to clinical practice. Therefore, students’ expectations for their learning and its relevance to their future clinical practice may not be met, which could undermine the meaning and perceived value of their learning.

Conversely, the results of this study showed students in the latter years of medical school scored higher on self-efficacy and QOL and lower on burnout than Year 2 students. This may be indicative of the development of adaptive coping mechanisms as students progress through the curriculum and transition into a clinical learning environment. Students can improve their study techniques and learning strategies, and gain effective time management and self-directed learning skills to cope with the demands of the curriculum (106). Student coping mechanisms may also increase
from the positive interactions in relation to learning with clinicians and patients, and a sense of accomplishment from progressing through clinical training (11).

However, not all experiences are positive during the clinical years of medical school. Henning et al (11) has reported on the difficulty students face in a clinical learning environment, indicating that students experience sleep deprivation, and in the clinical setting, may feel anxious and uncertain, and have problems with receiving negative or inconsistent feedback. These factors may go some way towards explaining the higher AM and EM scores reported among students in this study who are in the clinical years of medical school.

**Differences between admissions criteria**

The findings suggest significant differences in the experience of medical school, particularly among students admitted through the MAPAS scheme. MAPAS students reported higher levels of EM and burnout, and lower levels of physical and environmental QOL than students admitted through General Admission and Regional Rural Admission. These trends were consistent across all year levels.

From an academic learning perspective, the higher burnout scores reported among MAPAS students may be related to the medical school learning environment and ongoing concerns for academic performance. Reflecting the affirmative action pathway, admission GPAs for MAPAS students tend to be lower than the non-MAPAS students (98). Therefore, academic aspects of the medical programme may be more stressful for MAPAS students which could be a partial explanation for this study’s findings. Furthermore, tension between the mainstream learning environment and maintaining cultural values has also been reported by MAPAS students (107). It is perhaps this combination of factors that significantly contributes to the higher levels of burnout reported among MAPAS students. These trends are consistent with findings reported by Dyrbye et al (82) that showed that minority
students were more likely to report that their ethnicity had adversely affected their medical school experience, and racial discrimination, racial prejudice, feelings of isolation and different cultural expectations were cited as causes. Minority students were more likely to have burnout, depressive symptoms and low psychological QOL scores when compared with their peers who have more alignment with the mainstream learning environment and are more likely to be from the dominant societal group.

In New Zealand, ethnicity is strongly related to socio-economic position. At a societal level, differences in socio-economic status (SES) between NZ Māori and Pacific populations and other New Zealanders persist, and therefore, it is unsurprising that these differences may also be present in the medical student population, thereby impacting environmental QOL (108).

While these differences were observed by admissions criteria, the next study will expand upon the findings of the present study by analysing Māori and Pacific students separately rather than as a homogenous ‘MAPAS’ grouping.

**Limitations**

The potential for response or non-response bias is an ongoing challenge when conducting research in medical education because the number of people who respond and the characteristics of people who do not respond can influence the accuracy of study findings (103).

It is unlikely that this research was prone to a response bias as there is little in this study’s survey questionnaire to suggest systematic distortion in the way respondents answered questions. Response bias is a particular problem in survey questionnaires that investigate socially unacceptable behaviours such as drug taking or alcohol consumption (109) - this study’s questionnaire contained neither.
The potential for a non-response bias is pertinent in longitudinal research, such as this study, as the representativeness of study participants with the study population may change over time. Consistent with the population comparison method (103), the potential for non-response bias over time was evaluated within this study by comparing the background information of respondents to non-respondents, including their gender and admission status. While there was near representation of responders with non-responders over time based on their admission status, there was slight under representation of male responders when compared with potential responders. Therefore, there may be a risk of non-response bias based on gender. However, this risk was minimised by controlling for gender within the mixed model ANOVA analysis.

**Conclusion**

The aim of this study was to address a current gap in the literature by more rigorously investigating changes in academic motivation, burnout and QOL during the course of a medical programme, and how these changes may differ among subgroups of medical students. This study addresses the gap by indicating that changes in academic motivation, burnout and QOL occur longitudinally, and also vary by admission criteria.
CHAPTER 5

Motivation and well-being among indigenous and ethnic minority medical students
Introduction

The previous chapter identified differences in motivation and well-being between year level of the curriculum and by admissions criteria. This chapter considers potential differences in motivation and well-being based on a subgroup analysis of ethnicity.

Representation of indigenous and ethnic minorities in the medical profession is important to address disparities in health outcomes (1-3). Minority physicians can improve access to care for patients of similar ethnic backgrounds, are more likely to conduct research pertinent to concerns of minority patients and are fundamental to teaching students about cultural competence (3-5). To embrace diversity, many medical schools have implemented affirmative action programmes as interventions for minority students to help them succeed, the MAPAS programme being one example (2). Despite these interventions, minority students are more likely to struggle academically, which threatens the success of efforts aimed at promoting diversity in the medical workforce (6).

Academic difficulty among minority students during medical school has been well documented. However, the ways in which the training experiences of minority students compare with those of their colleagues remain relatively unexamined (1,7). An increasing body of literature suggests that, independent of ethnicity, medical students in New Zealand and abroad experience significant distress that is often manifested as depression, anxiety and/or burnout (8, 9). This distress has both personal and academic consequences, as it can impact QOL and academic motivation. Although curriculum factors such as academic assessment are known to contribute to student distress, little is known about distress among indigenous and ethnic minority students and how it influences their academic motivation (10).
Therefore, this study investigated motivation and well-being among indigenous and ethnic minority medical students with the view to gaining insight into potential differences in educational experiences during medical school.

Method

Subjects, procedures and instruments used
This study included students from Year 2 through to Year 5 of the medical programme studying in 2013. At the end of a lecture in July 2013, students were distributed the Motivation for Learning and Well-being Questionnaire. This questionnaire contained a demographic survey of questions pertaining to age, gender and ethnicity. Students self-reported their ethnicity, and their responses were then categorised into ethnic groups based on the NZ Ministry of Health ethnicity data protocols (16). The categories were NZ European, Māori, Pacific, Asian and Other Ethnicity. Consistent with the ethnicity data protocols, a prioritised response was used when students reported multiple ethnicities.

Statistical analyses
As mentioned previously, internal reliability measures of each section of the questionnaires were evaluated by Cronbach’s alpha coefficients. Chi-square analyses were conducted to determine any significant demographic differences between demographic variables.

A series of multivariate analyses of covariance (MANCOVA) were conducted: the first MANCOVA included measures of burnout and QOL as dependent variables; the second MANCOVA included measures of academic motivation, and self-efficacy and test anxiety as the dependent variables. Ethnicity was the independent variable of interest, and gender and year level were included as covariates.
Post hoc multiple group comparisons were adjusted using the Bonferroni correction for controlling Type 1 error. P values less than 0.05 were considered statistically significant. All tests were two-tailed. The effect size was calculated from partial eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110).

Results

Response rate

In total, 430 students participated in this study (response rate = 49%). Of these individuals, 57 were NZ Māori (13.3%), 36 Pacific (8.4%), 149 Asian (35%), 162 NZ European (38%) and 25 Other Ethnicity (5.8%). The Other Ethnicity group was excluded from statistical analysis because of low numbers of students and lack of specificity, or the wide-ranging or unknown backgrounds associated with this group. Therefore, 403 students were included for analysis related to ethnicity. All ethnic groups were similar with respect to age and year level; however, the Pacific ethnic group had fewer males when compared with the other ethnic groups. That is, 25% of male participants were of Pacific ethnicity, compared with NZ Europeans (37%), Māori (39%) and Asian (56%) [$X^2(3, N = 404) = 17.36, p = .001$]. The characteristics of participants are outlined in Table 5.1.

Table 5.1 Characteristics of medical student participants in this study

<table>
<thead>
<tr>
<th>Students</th>
<th>All students N = 403</th>
<th>Māori N = 57</th>
<th>Pacific N = 36</th>
<th>Asian N = 149</th>
<th>NZ European N = 162</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male, no. (%)</td>
<td>174 (43%)</td>
<td>22 (39%)</td>
<td>9 (25%)</td>
<td>83 (56%)</td>
<td>60 (37%)</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>22.1 (2.7)</td>
<td>22.5 (2.7)</td>
<td>22.4 (2.2)</td>
<td>21.7 (2.2)</td>
<td>22.0 (3.1)</td>
</tr>
<tr>
<td>Year 2</td>
<td>121</td>
<td>18</td>
<td>12</td>
<td>42</td>
<td>49</td>
</tr>
<tr>
<td>Year 3</td>
<td>72</td>
<td>13</td>
<td>4</td>
<td>21</td>
<td>34</td>
</tr>
<tr>
<td>Year 4</td>
<td>94</td>
<td>14</td>
<td>6</td>
<td>33</td>
<td>41</td>
</tr>
<tr>
<td>Year 5</td>
<td>116</td>
<td>12</td>
<td>14</td>
<td>53</td>
<td>37</td>
</tr>
</tbody>
</table>
**Burnout and QOL**

There were statistically significant differences in physical, psychological, social and environmental QOL between ethnic groups (Table 5.2). As outlined in Table 5.3, pairwise comparisons showed physical QOL scores were higher among NZ European medical students compared with non-NZ European medical students, while social QOL scores were higher among Māori, Pacific and NZ European medical students when compared with Asian medical students ($P < .05$). The Asian students also scored lower on psychological QOL than NZ European students, with a mean difference of $-1.0 (.3)$ ($P < .05$).

Pairwise comparisons also indicated that environmental QOL scores were lower among NZ Māori and Pacific students when compared with NZ European students, with mean differences in scores of $-0.9 (.3)$ and $-0.6 (.4)$ respectively. There were no significant differences in burnout scores between ethnic groups.

<table>
<thead>
<tr>
<th>Student Well-being</th>
<th>Māori</th>
<th>Pacific</th>
<th>Asian</th>
<th>NZ European</th>
<th>P Value**</th>
<th>Effect Size – Partial Eta Squared**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal burnout*</td>
<td>40.3 (2.1)</td>
<td>41.5 (2.6)</td>
<td>38.1 (1.2)</td>
<td>38.3 (1.2)</td>
<td>.567</td>
<td>.005</td>
</tr>
<tr>
<td>Physical QOL^</td>
<td>15.4 (.3)</td>
<td>15.1 (.3)</td>
<td>15.4 (0.2)</td>
<td>16.3 (0.2)</td>
<td>&lt;.001</td>
<td>.06</td>
</tr>
<tr>
<td>Psychological QOL^</td>
<td>14.7 (.3)</td>
<td>14.7 (.4)</td>
<td>14.2 (0.2)</td>
<td>15.1 (0.2)</td>
<td>.004</td>
<td>.03</td>
</tr>
<tr>
<td>Social QOL^</td>
<td>15.7 (.4)</td>
<td>15.6 (.5)</td>
<td>13.8 (0.2)</td>
<td>15.2 (0.2)</td>
<td>&lt;.001</td>
<td>.07</td>
</tr>
<tr>
<td>Environmental QOL^</td>
<td>14.8 (.3)</td>
<td>14.4 (.4)</td>
<td>15.1 (0.2)</td>
<td>15.7 (0.2)</td>
<td>.002</td>
<td>.04</td>
</tr>
</tbody>
</table>

* Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0 to 100

^ Measured by the WHOQOL-BREF; range of scores = 4–20

** The reporting least square means (LSMs) are adjusted for gender and year level

** P values from MANCOVA

xx Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)
Table 5.3 Post hoc comparisons of burnout and QOL between ethnic groups only, including significant dimensions of the domain

<table>
<thead>
<tr>
<th>Quality of Life and Burnout LSM (SE)</th>
<th>Comparisons</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>P Value*</th>
<th>95% Confidence Interval for Difference*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical QOL</td>
<td>Māori vs NZ European</td>
<td>−0.9</td>
<td>0.3</td>
<td>.023</td>
<td>(−1.6, −0.1)</td>
</tr>
<tr>
<td></td>
<td>Pacific vs NZ European</td>
<td>−1.3</td>
<td>0.4</td>
<td>.002</td>
<td>(−2.2, −0.3)</td>
</tr>
<tr>
<td></td>
<td>Asian vs NZ European</td>
<td>−0.9</td>
<td>0.2</td>
<td>&lt;.001</td>
<td>(−1.5, −0.3)</td>
</tr>
<tr>
<td>Psychological QOL</td>
<td>Asian vs NZ European</td>
<td>−1.0</td>
<td>0.3</td>
<td>.002</td>
<td>(−1.7, −0.3)</td>
</tr>
<tr>
<td>Social QOL</td>
<td>Māori vs Asian</td>
<td>1.8</td>
<td>0.4</td>
<td>&lt;.001</td>
<td>(.6, 3.0)</td>
</tr>
<tr>
<td></td>
<td>Pacific vs Asian</td>
<td>1.8</td>
<td>0.5</td>
<td>.006</td>
<td>(.3, 3.2)</td>
</tr>
<tr>
<td></td>
<td>NZ European vs Asian</td>
<td>1.5</td>
<td>0.3</td>
<td>&lt;.001</td>
<td>(.6, 2.3)</td>
</tr>
<tr>
<td>Environmental QOL</td>
<td>Māori vs NZ European</td>
<td>−.9</td>
<td>0.3</td>
<td>.047</td>
<td>(−1.8, −0.0)</td>
</tr>
<tr>
<td></td>
<td>Pacific vs NZ European</td>
<td>−0.6</td>
<td>0.4</td>
<td>.012</td>
<td>(−2.3, −0.2)</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the .05 level
* Adjustment for multiple comparisons: Bonferroni

**Motivation**

There were also statistically significant differences in academic motivation scores between ethnic groups (Table 5.4). As outlined in Table 5.5, pairwise comparisons revealed that Pacific and Asian students had higher EM scores than NZ European students, with mean differences of .4 (0.2) and 3 (0.1) respectively (P < .05). Pacific students also had higher test anxiety scores with differences in scores of .5 (0.2) and .6 (0.2) when compared with Asian and NZ European students (P < .05). All other comparisons were non-significant.
Table 5.4 Academic motivation least square mean (LSM) scores and standard errors (SE) by ethnicity

<table>
<thead>
<tr>
<th>Academic Motivation LSM** (SE)</th>
<th>Māori</th>
<th>Pacific</th>
<th>Asian</th>
<th>NZ European</th>
<th>P Value*</th>
<th>Effect Size – Partial Eta Squared**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic*</td>
<td>3.4 (0.1)</td>
<td>3.4 (0.1)</td>
<td>3.6 (0.1)</td>
<td>3.5 (0.1)</td>
<td>.179</td>
<td>.01</td>
</tr>
<tr>
<td>Extrinsic*</td>
<td>3.1 (0.1)</td>
<td>3.2 (0.1)</td>
<td>3.1 (0.1)</td>
<td>2.8 (0.1)</td>
<td>.002</td>
<td>.04</td>
</tr>
<tr>
<td>Self-efficacy¥</td>
<td>3.3 (0.1)</td>
<td>3.2 (0.1)</td>
<td>3.4 (0.1)</td>
<td>3.5 (0.1)</td>
<td>.042</td>
<td>.02</td>
</tr>
<tr>
<td>Test anxiety¥</td>
<td>3.1 (0.1)</td>
<td>3.4 (0.1)</td>
<td>2.9 (0.1)</td>
<td>2.8 (0.1)</td>
<td>.004</td>
<td>.03</td>
</tr>
<tr>
<td>Amotivation*</td>
<td>1.2 (0.1)</td>
<td>1.4 (0.1)</td>
<td>1.4 (0.1)</td>
<td>1.3 (0.1)</td>
<td>.032</td>
<td>.02</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5
¥ Measured by the MSLQ; range of scores = 1 to 5
** The reporting least square means (LSMs) are adjusted for gender and year level
xx P values from MANCOVA

Table 5.5 Post hoc comparisons of academic motivation between ethnic groups only, including significant dimensions of the domain

<table>
<thead>
<tr>
<th>Academic Motivation</th>
<th>Comparisons</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>P Value*</th>
<th>95% Confidence Interval for Difference*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic</td>
<td>Pacific vs NZ European</td>
<td>.5</td>
<td>.2</td>
<td>.018</td>
<td>(0.1, .9)</td>
</tr>
<tr>
<td></td>
<td>Asian vs NZ European</td>
<td>.3</td>
<td>.1</td>
<td>.033</td>
<td>(.0,.5)</td>
</tr>
<tr>
<td>Test anxiety</td>
<td>Pacific vs Asian</td>
<td>.5</td>
<td>.2</td>
<td>.017</td>
<td>(0.1, 1.0)</td>
</tr>
<tr>
<td></td>
<td>Pacific vs NZ European</td>
<td>.6</td>
<td>.2</td>
<td>.003</td>
<td>(0.2, 1.1)</td>
</tr>
</tbody>
</table>

Based on estimated marginal means
* The mean difference is significant at the .05 level
* Adjustment for multiple comparisons: Bonferroni

Discussion

The findings from this study suggest differences in QOL and academic motivation among indigenous and ethnic minority medical students. Pacific students reported higher levels of EM, test anxiety and social QOL in comparison with other ethnic groups. NZ European students generated higher scores for physical, psychological and environmental QOL. Asian students scored lowest on social QOL, whereas Māori and Pacific students scored lowest on environmental QOL.
Medical curricula and training should aim to produce equitable outcomes among medical students. However, the results of this study suggest differences in both motivation and well-being during medical school, particularly among ethnic minority medical students. NZ Māori and Pacific students scored lowest on measures of environmental QOL, which indicates potential socio-economic deprivation, related to a lack of income, access to transport and low satisfaction with living conditions (28). In New Zealand, ethnicity is strongly related to socio-economic position. At a societal level, differences in SES between NZ Māori and Pacific populations and other New Zealanders persist, and therefore, it is unsurprising that these differences may also be present in the medical student population (29). Socio-economic factors are thus one pathway through which ethnic differences in motivation and well-being may potentially be mediated.

Lower SES and poorer environmental QOL have been shown to adversely impact academic motivation among medical students. For example, in the study by Henning and colleagues (22), a correlation between environmental QOL and motivation was identified among NZ medical students, with higher environmental QOL positively correlated with intrinsic value and self-efficacy. Furthermore, Greenhalgh et al (30) reported that students in the United Kingdom from higher SES tended to focus on intrinsic factors such as challenge, achievement and fulfilment in medicine, whereas students of lower SES tended to focus on the extrinsic rewards such as expected income. A similar relationship is present in this study, which may account for NZ Māori and Pacific students scoring lower on environmental QOL but higher on EM scores, suggesting an extrinsic goal orientation approach to learning.

From an academic learning perspective, higher test anxiety scores were found among the Pacific students when compared with the NZ European students. These findings have implications for both academic motivation and achievement. High test
anxiety is negatively correlated with IM and subsequent academic performance (31, 32). In light of the differences in academic achievement among Pacific medical students previously documented, issues related to test anxiety need to be addressed (33). As a first step, it would be helpful to determine the type of test anxiety that students are experiencing, and to design corresponding interventions to address it. Interventions could take the form of skills training in test taking and anxiety management, and provision of appropriate academic, pastoral and psychological support for students who require it. Utilising senior students in tutor roles, particularly those with clinical experience, has helped Māori medical students gain confidence, self-belief and reduced anxiety while preparing them for an objective structured clinical examination (OSCE) (34). A similar approach could be considered for Pacific students.

The results of this study identified that Asian medical students scored highly on EM, when compared with NZ European students. Atkins et al (32) have reported similar findings in relation to high EM scores among Asian-American medical students. In their study, Asian students tended to study medicine because the profession is related to their parents' ideal of academic achievement or part of a family tradition. This is consistent with findings by Ng (35), who reported a strong sense of family obligation within the Chinese culture, which may contribute towards an extrinsic goal orientation for learning. Other studies have also reported that there are strong extrinsic reasons for students from certain Asian ethnic backgrounds to study medicine akin to family and community expectations (36). Therefore, EM likely plays a significant part in driving Asian medical students’ learning, and consequently, some students may feel pressured into medicine, which will likely have an adverse effect on their QOL.
This is reflected in high EM scores but low social QOL scores among the Asian ethnic group in this study. In a similar study investigating QOL among medical students at the University of Auckland, Henning et al (14) reported similar results showing Asian students scored lower on social QOL compared with non-Asian students. The low scores on social QOL suggested that Asian students perceived themselves to be less satisfied with their personal relationships and social support compared with other students. Several factors may have contributed to this perception, such as lack of meaningful social networks and social support systems and the experience of racial discrimination (14). Furthermore, there may be less emphasis on developing social relationships because of a strong emphasis placed on achieving academic goals (35, 37, 38). To respond to these challenges, fostering further social and pastoral support among Asian medical students could be considered, similar to the support provided to NZ Māori and Pacific medical students (2).

Of note were the high levels of social QOL reported by NZ Māori and Pacific students in this study. This may be reflective of the additional social support for Māori and Pacific medical students at the University of Auckland that is provided through two types of formal activities throughout the academic year: (1) a 3-day wānanga (camp) for all Māori and Pacific students entering a programme in the health professions and (2) regular cohort meetings held with year groups and a coordinator to share food, celebrate student success and identify any issues and challenges students are facing (2). Other activities include sports tournaments and social evenings, and informal opportunities for peer mentoring and study groups provide further pastoral support for Māori and Pacific students. A similar model of support could be considered for Asian medical students.
The present study has identified findings that can be used to provide a greater understanding of motivation and well-being within the context of ethnicity. With this in mind, additional academic support and pastoral assistance should be provided and efforts should be made to structure learning environments to better promote optimal motivation and enhance well-being for indigenous and ethnic minority medical students.
CHAPTER 6

A systematic review of the relationship between curriculum assessment methods and well-being among medical students
Introduction

The previous chapter discussed differences in motivation and well-being among subgroups of medical students. Prior to investigating the effect of a revised curriculum, this chapter outlines a systematic review that evaluates how specific curriculum factors (assessment methods) may be impacting on student well-being.

Medical training has been well documented in the literature as a time of high stress and anxiety for many medical students. A systematic review by Dyrbye et al (12) showed that psychological distress such as stress, anxiety and burnout among United States and Canadian medical students was consistently higher than the age-matched general population. Factors such as large course workloads and a concern for academic performance have been identified as contributors to this distress (10). Furthermore, studies have reported on a trend of increasing stress and anxiety for medical students during periods of academic assessment (111, 112). Often, the perceived difficulty of the assessment, and its importance to progression through training, plays a key role (113). Problems in recalling information, difficulty in memorising key points, poor study techniques, lack of confidence and inefficient time management skills among the students can be additional stressors (114). Demographic variables such as gender have also been demonstrated to have an effect, with female medical students tending to experience a greater level of assessment stress and anxiety compared with male students (114, 115).

A further concern is that with increased levels of stress or anxiety, academic performance may be impaired (112). The Yerkes-Dodson law suggests that increasing levels of anxiety or stress can lead to improved performance up to a certain level after which it can then become detrimental for performance by affecting working memory and ability to cope (116).
As there is an increasing emphasis for medical educators to take into account the health and well-being of medical students in the development of medical curricula, an aim of the study was to understand how methods of assessment impact on the psychological distress and subsequent performance of medical students with the aim of informing assessment practices.

This chapter describes a systematic review of the relationship between academic assessment and psychological distress among medical students to address the following questions:

1. How have researchers measured assessment stress or anxiety?
2. What assessment-related factors are associated with medical student stress or anxiety?
3. What is the relationship between assessment stress or anxiety and performance?
4. What are the limitations of current research and important areas for future investigation?

Due to the heterogeneity of the studies, such as the focus on various methods of assessment and use of different instruments to measure stress or anxiety, it was not possible to collate the data for a meta-analysis. Therefore, the studies were consolidated into a qualitative report with appropriate critical review.

To ensure uniformity and clarity, the following definitions were chosen by the author and checked by a research group for the purposes of this review. Medical students were defined as students enrolled in tertiary programmes who will eventually qualify as medical doctors. Assessments were defined as specific events that test the knowledge or performance of a medical student.
Literature searches of six electronic databases, MEDLINE, MEDLINE In-Process, PubMed, EMBASE, PsycINFO and ERIC, was completed. The key search terms used were in combinations of examination, or exam, or assessment, or appraisal, or test, or viva voce, or education measurement; and medical student; and medical school or medical curriculum or medical programme; and anxiety or stress or distress or burnout or pressure or coping or concern or worry or apprehension or nervousness or fear or addictive behaviour or depression or psychological disturbance. The search was limited to articles published in English between January 1991 and May 2014. All original research articles, reviews, editorials and essays were retrieved for examination, and a bibliography management programme (EndNote X3, Thomson Reuters, New York) was used to create a search library. The search yielded a total of 2,781 hits (after removal of duplicates). An additional 16 papers from a hand search of key journals and from reference lists were included. The author and independent research assistants, used to audit the selections, met to determine the review inclusion and exclusion criteria, and to select articles for critical appraisal and review. These criteria are listed below.

**Inclusion criteria**

1. All study participants are medical students.
2. The study describes specific features of an assessment.
3. The study measures the level of stress/well-being.
Exclusion criteria

1. The full text of the article has not been published in English.
2. The study was published prior to 1990 (to focus on current assessments used in medical education with contemporary measures of stress and anxiety).
3. The study results are duplicated in separate, earlier publications.
4. The article is a brief descriptive commentary or review article.

Each selected article was analysed independently by the author and a research assistant (as external moderator). As part of this process, each selected article was inspected to ascertain the specific methods of assessment that could affect medical student stress or anxiety. Any discrepancies in opinion between the author and the research moderators were identified and final agreement was reached after face-to-face discussion.

Critical appraisal framework

Data relevant to addressing the research questions was extracted by using a critical appraisal instrument (Table 6.1) (74). The instrument required consideration of the validity and reliability of the evidence presented in each article. The instrument also assessed study quality by considering factors that could contribute to risks of bias within each study, including recruitment methods, outcomes assessment and reporting of outcomes.

Table 6.1 Data extraction and critical appraisal instrument

<table>
<thead>
<tr>
<th>Study introduction</th>
<th>Research objectives and rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study context</td>
<td>Study setting, participant characteristics, description of the medical programme</td>
</tr>
<tr>
<td>Study methods</td>
<td>Study design, participant recruitment, study duration and follow-up, description of assessment/examination, measurement of stress / anxiety, appraisal of objective and subjective study outcomes, methods of statistical analysis</td>
</tr>
<tr>
<td>Study results</td>
<td>Main study findings</td>
</tr>
<tr>
<td>Study conclusions</td>
<td>Future implications and new insights</td>
</tr>
<tr>
<td>Risks of bias within each study</td>
<td>Selection bias, outcome bias</td>
</tr>
</tbody>
</table>
Results

In August 2011, a total of 100 articles were identified by the author and one independent researcher (as external moderator) as potentially relevant studies after the titles and online abstracts of the initial 1,813 were screened. From the 100 articles identified, the inclusion and exclusion criteria were used to select 57. These were obtained as full texts for examination. The selection of papers for this review was completed by October 2011 and a total of 11 studies were selected. Following a further literature search in May 2014, an additional 968 studies were identified (excluding duplicates). After titles and online abstracts were screened, the inclusion and exclusion criteria were used to identify 24 full-text papers for review, and a total of 23 studies in total were selected (Table 6.1). The critical appraisal and review of these studies are outlined below and structured according to the research questions outlined in the introduction of this chapter.
Study settings

Seven studies were set in the United States, originating from different medical faculties (117-123). Five studies were from India, the next most common setting (124-128). Studies were conducted in dedicated medical programmes. The majority of studies did not provide details of those programmes.

Study participants

The year level of participating medical students ranged from Year 1 to Year 5 (final year). One study included premedical students in addition to medical students as study participants (117).
Demographic information including the age and gender of participants was reported by 14 studies (114, 115, 118, 120, 123-132). A further six studies reported gender but no comment was made on the age of participants (119, 122, 133-136). Three studies did not report demographic variables (117, 137).

Assessment of baseline levels of participants’ perceived stress or anxiety was completed in nine studies (118, 125, 126, 129-131, 133, 134, 137). Seven studies assessed participants’ baseline levels of stress using physiological parameters such as blood pressure or heart rate (117, 118, 124, 125, 127, 128, 131).

**How have researchers measured assessment stress or anxiety?**

A variety of subjective outcomes were measured in the studies. Self-reported survey questionnaires were the most common form of evaluation created or adopted by investigators to evaluate the outcome measures. Investigators generally provided a brief description of the questionnaire. Six studies utilised the Spielberg Test Anxiety Inventory (115, 120, 129, 131, 136, 137). This inventory is a self-reported psychometric scale used to measure individual differences in test anxiety (18). Post-assessment interviews were a further subjective measure in one study (122).

Investigators also measured a range of objective physiological measures of stress or anxiety. For example, one study measured pulse and blood pressure and carried out an electrocardiogram (ECG) on participants at the time of a viva voce assessment (127). Another study measured the auditory reaction time, eosinophil count and galvanic skin resistance prior to a viva voce assessment (128). Three studies used salivary or blood biochemical markers as correlates for anxiety or stress levels that included cortisol, thyroid profiles and miRNA levels (118, 125, 129).
What assessment-related factors are associated with medical student stress or anxiety?

Assessment methods

Studies addressed the effect of specific methods of assessment on participant stress and anxiety. Broyles et al (122) evaluated whether an open-book setting for assessment reduces stress during a family medicine clerkship. During the study period, two sites used a closed-book setting for final written assessments in 2001. In 2002, the experimental site used an open-book setting for the final written assessment. Participants were interviewed immediately following this assessment. Answers were analysed using qualitative methodologies, and where indicated, percentages of responses were calculated within a theme. Key themes were generated to answer the study question. Over 80% of the participants described feelings of being less stressed about being assessed in an open-book setting.

Reteguiz (120) utilised the Spielberger Test Anxiety Inventory to assess levels of anxiety following a standardised patient (SP) assessment and a multiple choice question (MCQ) assessment during an internal medicine clerkship. Participants were categorised with low, moderate or high levels of anxiety. Study findings suggested a moderate level of anxiety associated with both SP and MCQ assessment methods. However, there were no significant differences in levels of anxiety between the assessments.

Anxiety or stress associated with clinical assessments was investigated in seven studies (119, 120, 124, 127, 128, 132, 137). The majority of study participants experienced increased levels of anxiety or stress associated with this type of assessment. This was demonstrated by elevated stress and anxiety scores reported from survey questionnaires, or an increase in physiological measures such as pulse rate and blood pressure at the time of the assessment.
Ping et al (137) evaluated the pattern of anxiety symptoms during the course of a clinical assessment. Anticipatory anxiety was found to be the most prominent form of anxiety experienced, with symptoms peaking 10 minutes before an assessment. These symptoms quickly subsided as the assessment proceeded. No resurgence of anxiety symptoms was reported in the presence of examiners. Students with high test anxiety trait scores as measured by the Spielberger Test Anxiety Inventory had significantly more anxiety symptoms during the assessment in comparison with students with lower scores.

Curriculum factors

A single study investigated the effect of grading systems on medical student well-being. Bloodgood et al (123) compared the impact of a change from a graded (A, B, C, D) to a pass/fail grading system on medical student anxiety, depression, positive well-being, self-control, vitality and general health. Two cohorts of medical students were surveyed, the last cohort under the five-interval grading system and the first cohort under the pass/fail grading system. The medical curriculum was reported as essentially identical between cohorts. Well-being was self-assessed by students with a web survey utilising the Dupuy General Well-Being Schedule. The pass/fail cohort exhibited a statistically significant increase in measures of well-being (P < 0.01) compared with the graded cohort.

The effect of an ‘honours’ system on levels of stress within the pass/fail class was also assessed in the same study. Within the pass/fail cohort, the top 20% of students were awarded ‘honours’. In a separate survey within this study, 70% of students who consciously chose to seek honours felt that this resulted in greater stress. In comparison, 92% of students who consciously chose not to pursue honours reported that this decision resulted in lower stress.
Hashmat et al (132) observed several factors that contributed to assessment anxiety among final year medical students. Extensive course work load, the long duration of periods of assessment, lack of assessment preparation and lack of exercise were reported to be the most important contributing factors. Many students also had little knowledge of assessment-taking and anxiety-reduction techniques. Yusoff (134) identified additional examination stressors, which included large amounts of content to be learnt for an examination, lack of time to review what had been previously learnt, self-expectation to perform well and concern about getting poor marks.

**Demographic factors associated with assessment stress and anxiety**

An interaction between gender, and assessment stress or anxiety was detected within many of the studies. Higher levels of assessment stress or anxiety were found among female medical students (114, 115, 119, 124, 132, 138). However, many studies in this review also found no relationship between gender and assessment stress or anxiety (118, 130, 131, 134).

**What is the relationship between assessment stress or anxiety and performance?**

Three studies addressed the influence of stress or anxiety on assessment performance. Reteguiz (120) found no evidence of an inverse relationship between anxiety level and performance as measured by the Spielberger Test Anxiety Inventory, and SP and MCQ assessment scores, suggesting performance was not impaired by anxiety. This finding conflicts with evidence reported by Frierson et al (121) that indicated a relationship exists between anxiety and impaired performance on the National Board of Examiners examination. Similarly, Farooqi (115) reported an inverse relationship between test anxiety and academic performance. Yusoff (134) also reported a relationship between moderate to high stress levels, and higher risk of failing an examination.
Hettiarachchi and colleagues (133) demonstrated a relationship between QOL and assessment performance. They found students who performed better at an examination had significantly higher QOL scores at each domain tested (physical, psychological, social and environmental QOL). In contrast, students with lower QOL scores tended to perform more poorly.

A significant gender effect on anxiety and performance was suggested by Pamphlet et al (136), with lower anxiety being positively associated with higher performance of female medical students in an MCQ assessment. However, this finding was not consistent with a study by Reteguiz, which found no gender differences in relation to assessment anxiety and performance (120).

**What are the limitations of current research and important areas for future investigation?**

**Methodological quality of studies**

*Study design:* All 23 studies identified were observational studies and most used an observational cohort study design. Seven studies used a comparison group for assessment of outcomes (114, 118, 119, 122, 123, 126, 134). In general, descriptions of study design by authors were limited, preventing replication of study methods. Study sample sizes varied significantly, with a range or difference of 440 participants between studies (smallest study n = 10, largest study n = 450). Variable response rates were also reported between studies (52% to 98%).

*Participant sampling and selection bias:* Participant recruitment or sampling methods were not described in the majority of studies in this review. Of the remaining studies discussing recruitment, two studies observed entire class cohorts, creating a potential for unmatched differences between cohorts (119, 123). Participation in these studies was based on voluntary self-selection. Only one study noted any explicit inclusion/exclusion selection criteria for participants (133).
**Outcome assessment bias:** In relation to reliability of assessment methods, one study discussed reliability of the SP and MCQ assessment, which was reported as 0.63 and 0.80 respectively (12). Colbert-Getz et al (119) also reported on the reliability of the SP assessment used in their study (Cronbach alpha was 0.64) (120). No other studies commented on assessment reliability.

The psychometric properties of the outcome evaluation tools employed were seldom reported. However, six studies reported the use of the Spielberger Test Anxiety Inventory to measure participant anxiety levels (120, 129-131, 136, 137). This inventory is considered a valid and reliable instrument of test anxiety (120, 139). Four studies reported the use of other measures of stress or anxiety, including the Dupuy General Well-Being Schedule, Zung’s Scale, an emotionality-worry scale, and a six-point Likert scale measuring anxiety (119, 121, 123, 124). According to Bloodgood (123), although the Dupuy General Well-Being Schedule is well validated in clinical studies, it has not been previously used in undergraduate medical education. Internal consistency of the emotionality-worry scale was reported (0.81 and 0.86 for each of the subscales) (121). Discussion of the validity of Zung’s Scale was not reported. As Colbert-Getz et al (119) measured student test anxiety with one survey item containing a six-point Likert scale, they could not determine the psychometric properties of anxiety ratings in their study.

Hettiarachchi et al (133). chose to use the WHOQOL-BREF instrument, which has been documented for its reliability and validity (54). Furthermore, the psychometric properties of the WHOQOL-BREF when applied to medical students has previously demonstrated adequate internal consistency and reliability (71).

A number of studies utilised physiological measures such as heart rate, blood pressure and cortisol levels, as a measure of stress or anxiety. However, changes in cortisol levels are not necessarily specific to stress or anxiety (140). Additionally,
Zeidner (141) considers physiological measures of assessment anxiety to be problematic both in a practical sense and in terms of construct validity.

Two studies examined alterations in miRNA profiles of medical students in order to measure stress responses prior to and following an assessment (129, 130). These alterations were then correlated with psychological anxiety as measured by the Spielberger Test Anxiety Inventory. Although the study authors hypothesised that an elevated miR-16/miR-144r may be a stress response to assessment-related stress and anxiety, the authors concluded that further studies are needed to prove their hypothesis.

A possible response bias was present in a study by Ping et al (137) that did not measure actual assessment performance but rather only perceived performance as reported by study participants. As a result, a social desirability bias may have occurred. This refers to an individual not adhering to a social norm but reporting a socially desirable behaviour when questioned (81). The study authors did not consider the potential impact of this bias on the validity of their research.

Reporting bias: Incomplete data collection and selective outcome reporting were potential sources of bias in all reviewed studies. Reasons for incomplete or missing data were commonly not described. The variable response rate between studies and the significance of non-participation bias were not addressed in the reviewed studies. In contrast with these sources of bias, most studies were at low risk of selective outcome reporting. Primary outcomes were measured and reported.

Discussion

This chapter described a systematic review that aimed to determine how methods of assessment impact on psychological distress and subsequent academic performance of medical students. To achieve this aim, several research questions
were used. The first question focused on how researchers have measured assessment stress or anxiety. The second question focused on the assessment-related factors that are associated with stress or anxiety. The third question was about the relationship between assessment stress or anxiety and performance; and the fourth question was about the limitations of current research.

The results of this review showed that studies have used a variety of methodologies, including psychological and physiological measures, to determine the impact of assessment on medical student stress and anxiety (RQ1). As the studies varied significantly, the degree of heterogeneity among these studies meant direct comparison was not possible. However, consistent among the studies was the finding that assessment invokes stress or anxiety as a result of a variety of factors, including assessment and curriculum factors, and gender- and student-related factors (RQ2).

These findings may be explained by both psychological factors and the learning environment. Psychological factors are considered a leading cause of assessment anxiety (132). Zeidner (141) suggested that students experiencing assessment anxiety are shown to be preoccupied with negative self-referential thoughts, including doubts about academic competence and fear of failure. Also of significance is the contribution of course load, duration of the assessment period, and lack of knowledge of assessment and anxiety-reduction techniques (24). These findings suggest that in addition to psychological factors, the learning environment may also contribute to assessment anxiety.

A relationship may exist between assessment stress or anxiety and assessment performance, although this finding was not consistent across all studies included in this review (RQ3). Therefore, the Yerkes-Dodson law could not be substantiated when applied in the context of medical education and assessment practices. The
Yerkes-Dodson law has been cited in this review because it is frequently mentioned in the literature on personal stress (142). However, it has limitations when used as a model, as it does not allow for causes, perceptions or coping mechanisms for stress or anxiety (142). Furthermore, as it is not specific to stress or anxiety, but rather a theory of physiological arousal, more appropriate frameworks for this relationship could be stress-specific theories such as the theory of cognitive appraisal by Lazarus and Folkman (143). This theory can elaborate further on the relationship between psychological distress and assessment performance, by considering both the meaning and the potential consequences of assessments for students, and the associated coping mechanisms. The stress of an assessment could relate to its perceived value, for example, whether an assessment is formative or summative, or its importance to progression through medical school. The potential consequences of this distress may be the development of adaptive or maladaptive coping mechanisms. Students may proactively cope by optimising study techniques and time management, or by seeking social support and additional tutoring; or they may cope maladaptively by adopting avoidant behaviours or mentally disengaging, or by alcohol and drug abuse (144).

The limitations of this review are derived mainly from limited reporting of study procedures or methodologies, which limited the extent to which the reviewer could draw firm conclusions about assessment stress or anxiety. These limitations also extend to risks of bias throughout the reviewed studies (RQ4). Self-selection bias was likely present among most studies in this review. This was heightened by a lack of description of participant selection methods and low participant response rates in many of the studies. A gender bias may also exist as a result of self-selection. The significance of social desirability bias must also be considered a result of self-reporting within many of the reviewed studies. Social desirability bias affects the
validity of a questionnaire and can confound relationships between variables by obscuring or producing artificial relationships among the variables (81). The majority of the articles reviewed provided only a brief outline of the questionnaires used. Researchers using questionnaires should consider the effect of socially desirable responding on the validity of their research.

This review has implications for assessment practices for medical students. Faculty should consider the impact of assessments on student stress and anxiety, particularly as future clinical practice is inherently stressful (145, 146). As students enter the workforce, their ability to cope may be eroded by their undergraduate training (147, 148). A counterargument is that the coping skills and resilience required for the workforce may be developed through experiences such as assessment. Faculty could also play a role in preparing students to cope with the stress associated with assessment (149). Interventions such as counselling services and stress management programmes are frequently reported in the literature as having a positive effect (132, 150).

An important gap in the literature is a lack of evidence that compares potential differences between high-stake or low-stake assessments, and formative or summative testing, on medical student stress and anxiety. Furthermore, the research currently available is limited by short follow-up durations and does not include information on the effect of ongoing exposure to assessment over the long term.

**Conclusions**

There is evidence to suggest academic assessment is associated with psychological distress among medical students. However, differences in the types of measures used by researchers limited the ability to draw conclusions about which methods of
assessment invoke greater distress. More rigorous study designs and the use of standardised measures are required.
CHAPTER 7

The impact of a change in curriculum and the implementation of progress testing on motivation, burnout and quality of life
Introduction

The previous chapters showed how medical students’ motivation and well-being can be influenced by curriculum factors. However, little is known about how curricula should be designed to enhance motivation and address the sources of distress and the effects of such changes (12, 15). Therefore, the aim of this study was to determine the effects of a change in a medical curriculum, including the introduction of progress testing, on students’ levels of motivation, burnout and QOL.

The most common curriculum reforms described and evaluated in the literature are changes to assessment methods, which were shown in Chapter 6 to have implications for student well-being (16, 123, 151, 152). Moving from numerical or letter-grade hierarchical systems to pass/fail grading is one such example (123). A further method of assessment that has been hypothesised to affect student motivation and well-being is progress testing; a form of longitudinal assessment that assesses the end objectives of a curriculum (19). Often, a number of tests are set during an academic year, each consisting of a large number of questions assessing graduate-level knowledge. Because progress tests are longitudinal measurements, it is assumed that students will be less anxious about passing or failing a single test, as a cross-sectional failure has little impact on a series of good results (19, 153). However, these hypothesised benefits remain untested and the extent to which progress testing affects student distress remains unknown.

Similarly, it is unclear from the existing literature whether or not progress testing fosters a deep approach to learning as theorised. For example, a study by Blake et al (154) showed that the overall effect of progress testing on students’ approach to learning was minimal. Van Berkel et al (155) also investigated the influence of
progress tests on study behaviours, and could not conclude whether progress tests promote intrinsically motivated learning.

Mcleod and Steinert (156) have proposed that curricula renewal should require an evaluation of any changes that are introduced in order to monitor the outcomes of such changes. Therefore, this study was undertaken to investigate differences in academic motivation, burnout and QOL between cohorts of medical students in a traditional and revised curriculum, and to examine how they vary between pre-clinical medical students and students in their clinical years of training.

**Method**

**Subjects and procedures**

As previously noted, the University of Auckland has a six-year undergraduate medical programme consisting of three years of predominantly basic sciences followed by three clinically oriented years. Students surveyed in this study included second and fourth year students at the University of Auckland. Similar to the previous studies, at the end of a lecture students were asked to complete the *Motivation for Learning and Well-being Questionnaire* (17-20).

**Statistical analyses and ethics approval**

The analysis involved the comparison of two medical school cohorts at the University of Auckland; the cohort of 2012 \((n = 437)\), the last cohort under the traditional curriculum, and the class of 2013 \((n = 446)\), the first cohort under the revised curriculum, a major part of which was the inclusion of progress testing. A summary of the revised curriculum is provided in Chapter 1 of this thesis.

As previously ascertained, internal reliability measures, Cronbach's alpha coefficients, for each section of the questionnaires were determined (157). Chi-square analyses were conducted to determine any significant demographic
differences between cohorts within each curriculum. Any significant demographic differences were then included in a MANCOVA model as covariates. As per Chapter 4, the ‘Other’ ethnicity group was excluded from statistical analysis because of low numbers of students and lack of specificity, or the wide-ranging or unknown backgrounds associated with this group.

Two MANCOVA were conducted: the first with measures of QOL and burnout as the dependent variables, and the second with academic motivation as the dependent variable. The independent variable was curriculum cohort, and covariates were included based on the findings of the chi-square analysis. The effect size was calculated from partial eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110).

**Results**

As previously confirmed, the Cronbach alpha scores for each of the WHOQOL domains, CBI, AMS and MSLQ subscales were within acceptable limits (158).

The response rate was 48%. The mean age of the sample was 22 years. Males represented 232 of the 441 participants. Based on a chi square analysis, no statistically significant differences in age, gender, ethnicity or admission criteria were noted between curriculum cohorts. However, a year-level difference was noted between curriculum cohorts, and therefore, year level was included in the MANCOVA model as a covariate (Table 7.1).
Table 7.1 Study participant characteristics by curriculum

<table>
<thead>
<tr>
<th>Student Characteristics</th>
<th>All Students N = 426</th>
<th>Students in Traditional Curriculum N = 212</th>
<th>Students in Revised Curriculum N = 214</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male, no. (%)</td>
<td>192 (43%)</td>
<td>93 (44)</td>
<td>91 (43)</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>21.8 (3.0)</td>
<td>22.0 (3.1)</td>
<td>21.5 (2.9)</td>
</tr>
<tr>
<td>Year 2</td>
<td>207</td>
<td>87</td>
<td>125</td>
</tr>
<tr>
<td>Year 4</td>
<td>219</td>
<td>120</td>
<td>94</td>
</tr>
<tr>
<td>General Admission</td>
<td>251</td>
<td>129</td>
<td>122</td>
</tr>
<tr>
<td>MAPAS</td>
<td>91</td>
<td>44</td>
<td>47</td>
</tr>
<tr>
<td>Regional Rural</td>
<td>56</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>International</td>
<td>27</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>

The MANCOVA showed no statistically significant differences between curriculum cohorts on mean scores of burnout, QOL and academic motivation (Table 7.2, Table 7.3).

Table 7.2 Burnout and QOL least square mean (LSM) scores and standard errors (SE) by curriculum

<table>
<thead>
<tr>
<th>Well-being LSM (SE)</th>
<th>Students in Traditional Curriculum N = 212</th>
<th>Students in Revised Curriculum N = 214</th>
<th>P Value**</th>
<th>Effect Size –Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal burnout*</td>
<td>39.9 (1.1)</td>
<td>39.2 (1.1)</td>
<td>.673</td>
<td>.000</td>
</tr>
<tr>
<td>Physical QOL^</td>
<td>15.5 (0.1)</td>
<td>15.7 (0.1)</td>
<td>.462</td>
<td>.006</td>
</tr>
<tr>
<td>Psychological QOL^</td>
<td>14.5 (0.2)</td>
<td>14.5 (0.2)</td>
<td>.905</td>
<td>.000</td>
</tr>
<tr>
<td>Social QOL^</td>
<td>15.0 (0.2)</td>
<td>14.7 (0.2)</td>
<td>.358</td>
<td>.002</td>
</tr>
<tr>
<td>Environmental QOL^</td>
<td>14.8 (0.2)</td>
<td>15.2 (0.2)</td>
<td>.095</td>
<td>.007</td>
</tr>
</tbody>
</table>

* Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0 to 100
^ Measured by the WHOQOL-BREF; range of scores = 4–20
** The reporting least square means (LSMs) are adjusted for year level
** P values from MANCOVA
xx Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)
Table 7.3 Academic motivation least square mean (LSM) scores and standard errors (SE) by curriculum

<table>
<thead>
<tr>
<th>Academic Motivation LSM** (SE)</th>
<th>Traditional Curriculum</th>
<th>Revised Curriculum</th>
<th>P Value**</th>
<th>Effect Size – Partial Eta Squared**xx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic*</td>
<td>3.5 (.04)</td>
<td>3.5 (.04)</td>
<td>.258</td>
<td>.003</td>
</tr>
<tr>
<td>Extrinsic*</td>
<td>3.0 (0.1)</td>
<td>3.0 (0.1)</td>
<td>.719</td>
<td>.000</td>
</tr>
<tr>
<td>Amotivation*</td>
<td>1.4 (.04)</td>
<td>1.3 (.04)</td>
<td>.080</td>
<td>.007</td>
</tr>
<tr>
<td>Self-efficacyX</td>
<td>3.4 (0.1)</td>
<td>3.3 (0.1)</td>
<td>.295</td>
<td>.003</td>
</tr>
<tr>
<td>Test anxietyX</td>
<td>2.9 (0.1)</td>
<td>2.9 (0.1)</td>
<td>.781</td>
<td>.000</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5

** Measured by the MSLSQ; range of scores = 1 to 5

** The reporting least square means (LSMs) are adjusted for year level

** P values from MANCOVA

**x Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)

When comparing difference by year level, the MANCOVA for Year 2 students showed that there were no significant differences between curricula with respect to burnout and QOL, academic motivation, self-efficacy and test anxiety (Table 7.4, Table 7.5).

Table 7.4 Burnout and QOL least square mean (LSM) scores and standard errors (SE) by curriculum among Year 2 students

<table>
<thead>
<tr>
<th>Well-being LSM** (SE)</th>
<th>Year 2 Traditional Curriculum</th>
<th>Year 2 Revised Curriculum</th>
<th>P Value**</th>
<th>Effect Size – Partial Eta Squared**xx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal burnout*</td>
<td>41.8 (1.7)</td>
<td>41.9 (1.4)</td>
<td>.953</td>
<td>.000</td>
</tr>
<tr>
<td>Physical QOL^</td>
<td>15.2 (0.2)</td>
<td>15.2 (0.2)</td>
<td>.977</td>
<td>.000</td>
</tr>
<tr>
<td>Psychological QOL^</td>
<td>14.2 (.3)</td>
<td>13.9 (0.2)</td>
<td>.405</td>
<td>.003</td>
</tr>
<tr>
<td>Social QOL^</td>
<td>14.8 (.3)</td>
<td>14.2 (.3)</td>
<td>.192</td>
<td>.008</td>
</tr>
<tr>
<td>Environmental QOL^</td>
<td>14.8 (0.2)</td>
<td>14.7 (0.2)</td>
<td>.689</td>
<td>.000</td>
</tr>
</tbody>
</table>

* Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0 to 100

^ Measured by the WHOQOL-BREF; range of scores = 4–20

** P values from MANCOVA

Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)
Table 7.5 Academic motivation least square mean (LSM) scores and standard errors (SE) by curriculum among Year 2 students

| Academic Motivation LN** (SE) | Year 2 Traditional Curriculum | Year 2 Revised Curriculum | P Value** | Effect Size – Partial Eta Squared
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic*</td>
<td>3.5 (0.1)</td>
<td>3.6 (0.1)</td>
<td>.158</td>
<td>.010</td>
</tr>
<tr>
<td>Extrinsic*</td>
<td>2.8 (0.1)</td>
<td>2.9 (0.1)</td>
<td>.336</td>
<td>.005</td>
</tr>
<tr>
<td>Amotivation*</td>
<td>1.3 (0.1)</td>
<td>1.3 (0.1)</td>
<td>.775</td>
<td>.000</td>
</tr>
<tr>
<td>Self-efficacyX</td>
<td>3.3 (0.1)</td>
<td>3.2 (0.1)</td>
<td>.325</td>
<td>.005</td>
</tr>
<tr>
<td>Test anxietyX</td>
<td>3.0 (0.1)</td>
<td>3.1 (0.1)</td>
<td>.427</td>
<td>.003</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5
X Measured by the MSLQ; range of scores = 1 to 5
** P values from MANCOVA
xx Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)

However, the MANCOVA findings for Year 4 students showed a significant difference in physical and environmental QOL scores between the two curricula (Table 7.6). Year 4 students in the revised curriculum scored higher on measures of physical and environmental QOL than students in the traditional curriculum, with a difference in mean scores of 0.6 (0.2) and 1.1 (0.2). There was also a strong trend towards improvement in psychological QOL of marginal significance with a difference in mean score of 0.6 (0.2) and a P value of .052. There were no significant associations between the traditional and revised curriculum with burnout and social QOL.
Table 7.6 Burnout and QOL least square mean (LSM) scores and standard errors (SE) by curriculum among Year 4 students

<table>
<thead>
<tr>
<th>Well-being</th>
<th>Year 4 Traditional Curriculum</th>
<th>Year 4 Revised Curriculum</th>
<th>P Value**</th>
<th>Effect Size – Partial Eta Squared**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal burnout</td>
<td>38.9 (1.4)</td>
<td>34.9 (1.6)</td>
<td>.071</td>
<td>.15</td>
</tr>
<tr>
<td>Physical QOL</td>
<td>15.8 (0.2)</td>
<td>16.4 (0.2)</td>
<td>.022</td>
<td>.02</td>
</tr>
<tr>
<td>Psychological QOL</td>
<td>14.7 (0.2)</td>
<td>15.3 (0.2)</td>
<td>.052</td>
<td>.02</td>
</tr>
<tr>
<td>Social QOL</td>
<td>15.1 (.3)</td>
<td>15.5 (.3)</td>
<td>.355</td>
<td>.01</td>
</tr>
<tr>
<td>Environmental QOL</td>
<td>14.8 (0.2)</td>
<td>16.0 (0.2)</td>
<td>&lt;.001</td>
<td>.059</td>
</tr>
</tbody>
</table>

* Measured by the Copenhagen Burnout Inventory – Personal burnout subscale; range of scores = 0 to 100
^ Measured by the WHOQOL-BREF; range of scores = 4–20
** P values from MANCOVA
** Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)

In relation to academic motivation, the MANCOVA results for Year 4 students showed no significant differences between the traditional and revised curricula (Table 7.7).

Table 7.7 Academic motivation least square mean (LSM) scores and standard errors (SE) by curriculum among Year 4 students

<table>
<thead>
<tr>
<th>Academic Motivation LSM** (SE)</th>
<th>Year 4 Traditional Curriculum N = 125</th>
<th>Year 4 Revised Curriculum N = 101</th>
<th>P Value**</th>
<th>Effect Size – Partial Eta Squared**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic</td>
<td>3.5 (0.1)</td>
<td>3.5 (0.1)</td>
<td>.685</td>
<td>.001</td>
</tr>
<tr>
<td>Extrinsic</td>
<td>3.2 (0.1)</td>
<td>3.1 (0.1)</td>
<td>.292</td>
<td>.005</td>
</tr>
<tr>
<td>Amotivation</td>
<td>1.5 (0.1)</td>
<td>1.3 (0.1)</td>
<td>.057</td>
<td>.017</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>3.5 (0.1)</td>
<td>3.5 (0.1)</td>
<td>.658</td>
<td>.001</td>
</tr>
<tr>
<td>Test anxiety</td>
<td>2.9 (0.1)</td>
<td>2.7 (0.1)</td>
<td>.102</td>
<td>.012</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5
^ Measured by the MSLQ; range of scores = 1 to 5
** P values from MANCOVA
** Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)

Discussion

The findings from this study showed that there were no statistically significant differences between cohorts of medical students under traditional and revised curricula in relation to academic motivation, personal burnout and QOL. However,
differences were found among students in their clinical years of training. Curriculum factors were associated with small but statistically significant differences in physical and environmental QOL. These findings suggest that changes in a curriculum may have had a differential effect on medical student QOL for those students in the latter years of medical school who are based in a clinical learning environment.

Although there have been a multitude of relatively minor revisions to the medical curriculum at the University of Auckland, this paper focuses particularly on the effect of progress testing because it is often stated that assessment drives learning and because progress testing was perceived by all as the major change in curriculum (159). It has also been established in studies of medical curricula reform that the way students are evaluated has a greater impact on their well-being than other aspects of curriculum structure (160).

The a priori hypotheses of this study postulated that an increase in IM and QOL scores and a reduction in burnout would be observed following the introduction of the revised curriculum and progress testing. Taken as a whole, the observations that no significant differences were found in scores between curriculum cohorts is surprising, especially when considered alongside other studies that have demonstrated that changes in curricula often have an impact (123, 151, 152, 160).

A possible explanation for differences in findings between the Year 2 (pre-clinical) and Year 4 (clinical) students relates to the differences in the implementation of progress testing across these year levels. Progress testing for Year 2 students is utilised alongside traditional block testing as part of the overall evaluation of student performance. Previous findings from Van Berkel (155) have demonstrated the detrimental effects of assessment systems on student learning when both progress tests and block tests are used. Block testing often reinforces a reproduction and
performance-oriented approach to learning, which is the antithesis of progress testing, which aims to foster a deep approach to learning (154).

Similarly, the potential benefits of progress testing for student motivation and QOL may not have been realised for Year 2 students in this study, because the use of both progress testing and block testing could have had diverging influences on the quality of study behaviour. This influence was also observed following the implementation of progress testing at Maastricht University (19). When block tests were made formative, students changed their focus to continuous self-directed learning, but when the block test was made summative again, many students reverted to short-term memorisation despite the progress test remaining unchanged (19).

Another explanation could be that junior medical students at this stage are still unsure about their study behaviour, which was found to be one of the main stressors among medical students in one study (161). When this uncertainty is taken in the context of newly introduced progress testing, it may have undermined its potential benefits because of the need to adapt study behaviours. This uncertainty was likely exacerbated by limited availability of learning resources specific to progress testing to aid student learning (161).

For the Year 4 students in this study, progress testing was implemented alongside clinical and professional skills assessments. Following the introduction of progress testing as part of the revised curriculum, there were no significant changes in academic motivation scores. These findings are consistent with results from Chen et al (162), who also conducted a study of Year 4 students in the revised medical curriculum at the University of Auckland. Their study aimed to determine the effect of progress testing on medical students’ approaches to learning and stress, and found a decrease in surface approaches to learning over time but no corresponding
increase in a deep approach to learning. Similarly, Blake et al (154) also observed a decline in superficial learning strategies but no increase in a deep approach to learning, following the implementation of progress testing to the curriculum at McMasters University. The consistency of these findings suggests that progress testing may play a role in moving students away from extrinsic and superficial learning approaches, but not necessarily towards an intrinsic and deep approach to learning.

Cognitive evaluation theory (CET) could provide a possible explanation for this shift in learning behaviour (163). CET implies that, based on how rewards are interpreted, EM may reduce IM. For example, if medical students perceive progress testing as indicative of external control by the medical school, their IM is likely to reduce; if it is perceived as providing positive information about their level of knowledge and competence, then IM is likely to increase (164).

Following the introduction of the revised curriculum, a small but significant increase in physical and environmental QOL scores was observed for Year 4 students. The improvement in environmental QOL scores may be attributable to student ‘cohorting’ under the new curriculum in which students remain at one clinical campus for an academic year, therefore avoiding the need for travel between campuses that was a feature of the traditional curriculum. Another difference was the introduction of general practice teaching on campus, rather than within general practice clinics across Auckland or rurally. These two initiatives may have alleviated problems with transportation, which is associated with improving environmental QOL among medical students (165).

The improvement in physical QOL scores corresponds to the timing of the implementation of the Personal and Professional Skills domain within the revised
curriculum. Key topics of the health and well-being component of this domain include stress management, exercise and nutrition, healthy thinking, and improving health-seeking behaviours. It may be that initiatives such as these are having a positive impact on students' physical health, reflected by the increasing physical QOL scores seen in this study. However, further research is needed to clarify the effectiveness of such initiatives.

**Conclusion**

The results of this study illustrate that the implementation of a revised curriculum may have had a differential effect on medical student motivation and QOL, particularly for those students in the latter years of medical school who are based in a clinical learning environment. Medical schools should consider optimising curriculum structure and assessment methods to reduce student distress and promote motivation for learning and QOL.

The next study expands upon the findings of this present study to determine whether QOL and burnout are associated with different motivation orientations. It also investigates the effect of these same measures on academic achievement.
CHAPTER 8

Associations between burnout, quality of life, motivation and academic performance: A person-oriented approach
Introduction

The previous chapters have highlighted how motivation and well-being can be influenced by demographic and curriculum factors. This chapter will now address the last objective of this research, which is to determine associations between motivation, well-being and academic achievement.

The systematic review from Chapter 2 identified a relationship between motivation, well-being and academic achievement. The review included a number of studies, such as that by Artino et al (77) that reported how task value and self-efficacy motivation is positively correlated with student enjoyment and course examination grade, while anxiety is negatively correlated with course examination grade. Similarly, a study by Park et al (73) showed an association between stress, academic motivation and achievement. In this study, students with higher stress scores scored higher on AM and lower on their GPA than students with lower stress scores.

As identified in the systematic review, Henning et al (14) investigated associations between medical students’ perceptions of QOL, motivation to learn and self-disclosed academic achievement. The findings of their study suggested positive correlations between QOL, motivation to learn and written examination grades. However, Del-Ben et al (76) found that increased anxiety, decreased academic motivation and a maladjusted leisure and social life had no significant correlations with examination grades.

These studies have explored the relationship between psychological distress or QOL with study outcomes as group variables, which is known as a variable-oriented approach (37). This approach is useful for understanding how psychological distress and QOL influences motivation and academic achievement, and also the direction of influence.
An alternative approach is to look at how individual students differ in their levels of psychological distress and QOL and how this relates to their academic outcomes by using a person-oriented approach. In this approach, the individual student is seen as a functioning totality, best studied by analysing patterns of information together, not separate and isolated variables, and by searching for common patterns each being shared by a subgroup of the total sample (166). In essence, the aim of this approach is to categorize individuals into distinct groups whose members share similar characteristics or profiles.

Within the context of QOL and burnout, a person-oriented approach could firstly promote understanding of students as unique individuals by considering the many facets of QOL and burnout experienced by students rather than considering each facet in isolation (37, 167). Secondly, a person oriented approach could categorise individual students into distinct groups whose members share similar burnout and QOL profiles. From a theoretical perspective, this approach can give novel and unique insights about inter-individual differences and intra-individual variation that could be overlooked or misunderstood in variable-oriented approaches (168). From a practical perspective, such information might be useful both from a diagnostic viewpoint and from an intervention viewpoint (169). For instance, interventions to address burnout and enhance QOL can be tailored to each particular profile.

The systematic review presented in Chapter 2 did not identify any studies in medical education that have utilised a person-oriented approach to exploring burnout and QOL, and their effects on academic motivation and achievement. Therefore, the objective of this study was to utilise a person-oriented approach to generate burnout and QOL profiles of medical students, and determine their associations with academic motivation and achievement.
Method

Subjects and procedures

Participants in this study were self-selected volunteers in Year 3, Year 4 and Year 5 of the medical programme (Table 8.1).

The first part of this study was carried out over a two-week period between June and July of 2014. At the end of a lecture, students were distributed and completed the Motivation for Learning and Well-being Questionnaire.

The second part of this study was carried out in October 2014, which included collecting student academic performance data based on progress tests completed in April, July and October 2014 respectively.

Ethics approval and statistical analyses

Written informed consent to participate was obtained from all students, and ethics approval was obtained from the UAHEPC (Ref 8467).

All statistical analyses were performed using IBM SPSS 22.0 for Mac. Internal reliability measures, Cronbach’s alpha coefficients, for each section of the questionnaires were determined.

Participants were classified to different profiles based on WHOQOL-BREF and CBI scores using a two-step cluster analysis (170). The two-step clustering method within the auto-cluster modelling node was chosen because of its ability to handle both continuous and categorical variables. The two-step cluster analysis method operates through firstly scanning the data in a pre-classificatory stage and identifying ‘dense’ regions of data that share similar values across a range of variables (171). An algorithm similar to an agglomerative hierarchical clustering method is then used to classify the data (170). The algorithm used the log-likelihood distance measure and Schwarz’s Bayesian Criterion (BIC) to derive the cluster solutions (burnout and QOL.
profiles) by maximising between-group heterogeneity and within group homogeneity and thereby capture the interactions between dimensions of QOL and burnout.

Once the burnout and QOL profiles were derived, Chi-square analyses were conducted to determine any significant differences in characteristics between profiles. Any significant differences were then included in a MANCOVA model as covariates.

A MANCOVA model was used to determine differences between profiles in relation to academic motivation, self-efficacy and academic performance. Profile membership was included in the model as the independent variable, and the dependent variables were IM, EM, AM, test anxiety and self-efficacy scores. Post hoc multiple group comparisons were adjusted using the Bonferroni correction for controlling Type 1 error. The effect size was calculated from partial eta squared: Small = 0.0–0.06, Medium = 0.06–0.138, Large > 0.138 (110)

A separate repeated measures analysis of covariance (ANCOVA) method was also used to compare changes in academic achievement over time. Profile membership was included in the model as the independent variable, and the three progress test scores were designated as dependent variables. Year level and gender were included in both models as potential confounding variables.

Pearson’s correlations were also used to determine any associations between QOL domain scores, academic motivation scores and progress test scores.

Results

The response rate was 47%. Of these respondents, 44% were male and 56% were female. The two-step cluster analysis derived three distinct cluster solutions (profiles) with a silhouette coefficient of 0.3 which represents a fair cluster solution (171).
The frequencies and proportions of students represented in each of the burnout and QOL profiles are shown in Table 8.1. Thirty-nine per cent of students were represented in the Lower Burnout Higher QOL profile, 41% of students were in the Moderate Burnout Moderate QOL and the remaining 20% were in the Higher Burnout Lower QOL.

The results of the chi square analysis showed the distribution of gender ($\chi^2 (2, N = 316) = 5.60, p = .061$) and admission status ($\chi^2 (6, N = 315) = 3.95 p = .684$) were not significantly different between profiles. However, student year level was significantly different between profiles ($\chi^2 (4, N = 317) = 9.86 p = .043$). A higher proportion of students in Year 3 of the medical programme were in the Higher Burnout Lower QOL and a lower proportion were in the Lower Burnout Higher QOL profiles compared with other year levels (Table 8.1). Therefore, year level was controlled for while conducting subsequent analyses. Gender was also controlled for in subsequent analyses as it was nominally significant ($p = .061$) and previous literature has suggested a gender effect in relation to psychological distress (12).
Table 8.1 Demographics and characteristics of profiles

<table>
<thead>
<tr>
<th>Profile Membership N (%)</th>
<th>Higher Burnout Lower QOL (HBLQ)</th>
<th>Moderate Burnout Moderate QOL (MBMQ)</th>
<th>Lower Burnout Higher QOL (LBHQ)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students</td>
<td>62 (20%)</td>
<td>131 (41%)</td>
<td>124 (39%)</td>
<td>316</td>
</tr>
<tr>
<td>Males</td>
<td>21 (15%)</td>
<td>54 (39%)</td>
<td>64 (46%)</td>
<td>139</td>
</tr>
<tr>
<td>Females</td>
<td>40 (23%)</td>
<td>77 (44%)</td>
<td>60 (33%)</td>
<td>177</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>22.9</td>
<td>22.8</td>
<td>24.4</td>
<td></td>
</tr>
<tr>
<td>General Admission</td>
<td>38 (21%)</td>
<td>75 (42%)</td>
<td>67 (37%)</td>
<td>180</td>
</tr>
<tr>
<td>MAPAS Admission</td>
<td>14 (22%)</td>
<td>24 (38%)</td>
<td>25 (40%)</td>
<td>63</td>
</tr>
<tr>
<td>Regional Rural Admission</td>
<td>5 (10%)</td>
<td>21 (43%)</td>
<td>23 (47%)</td>
<td>49</td>
</tr>
<tr>
<td>International Admission</td>
<td>5 (22%)</td>
<td>10 (43%)</td>
<td>8 (35%)</td>
<td>23</td>
</tr>
<tr>
<td>Year 3</td>
<td>18 (21%)</td>
<td>44 (50%)</td>
<td>26 (29%)</td>
<td>88</td>
</tr>
<tr>
<td>Year 4</td>
<td>18 (20%)</td>
<td>41 (46%)</td>
<td>31 (34%)</td>
<td>90</td>
</tr>
<tr>
<td>Year 5</td>
<td>26 (19%)</td>
<td>46 (33%)</td>
<td>67 (48%)</td>
<td>139</td>
</tr>
</tbody>
</table>

All measures were found to be internally consistent and within acceptable limits (157, 158).

Correlation analysis showed that burnout was positively correlated with AM \( (r = 0.26, \ p = <.001) \) and test anxiety \( (r = 0.36, \ p = <.001) \), and negatively correlated with IM \( (r = -0.16, \ p = .005) \), self-efficacy \( (r = -0.29, \ p = <.001) \) and mean progress test score \( (r = -0.14, \ p = .011) \). Furthermore, multiple dimensions of QOL were positively correlated with IM and self-efficacy, and negatively correlated with AM and test anxiety (Table 8.2).
Table 8.2 Correlations between burnout and QOL with academic motivation

<table>
<thead>
<tr>
<th></th>
<th>Intrinsic Motivation</th>
<th>Extrinsic Motivation</th>
<th>Amotivation</th>
<th>Self-efficacy</th>
<th>Test Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Burnout</td>
<td>-.156**</td>
<td>.006</td>
<td>.263**</td>
<td>-.228**</td>
<td>.361**</td>
</tr>
<tr>
<td>Physical QOL</td>
<td>.168**</td>
<td>-.020</td>
<td>-.168**</td>
<td>.278**</td>
<td>-.240**</td>
</tr>
<tr>
<td>Psychological QOL</td>
<td>.202**</td>
<td>-.010</td>
<td>-.312**</td>
<td>.346**</td>
<td>-.334**</td>
</tr>
<tr>
<td>Social QOL</td>
<td>.076</td>
<td>-.083</td>
<td>-.307**</td>
<td>.181**</td>
<td>-.152**</td>
</tr>
<tr>
<td>Environmental QOL</td>
<td>.112*</td>
<td>.056</td>
<td>-.105</td>
<td>.197**</td>
<td>-.242**</td>
</tr>
</tbody>
</table>

** Correlation significant at the 0.01 level (2-tailed).
* Correlation significant at the 0.05 level (2-tailed)

In relation to burnout and QOL profiles, the results of the MANCOVA indicated significant differences in academic motivation for different profiles, with Higher Burnout Lower QOL scoring lower on IM and SE, and higher on AM and test anxiety (Table 8.3). The largest effects tended to be associated with test anxiety and AM, which had effect sizes of medium to large (110).

Table 8.3 Academic motivation least square mean (LSM) scores and standard errors (SE) by profile membership

<table>
<thead>
<tr>
<th>Profile Membership LSM (SE)**</th>
<th>Higher Burnout Lower QOL (HBLQ)</th>
<th>Moderate Burnout Moderate QOL (MBMQ)</th>
<th>Lower Burnout Higher QOL (LBHQ)</th>
<th>P Value**</th>
<th>Effect Size –Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic†</td>
<td>3.3 (0.1)</td>
<td>3.5 (0.1)</td>
<td>3.6 (0.1)</td>
<td>.006</td>
<td>.03</td>
</tr>
<tr>
<td>Extrinsic†</td>
<td>2.9 (0.1)</td>
<td>3.0 (0.1)</td>
<td>2.8 (0.1)</td>
<td>.240</td>
<td>.01</td>
</tr>
<tr>
<td>Self-efficacy†</td>
<td>3.3 (0.1)</td>
<td>3.5 (0.1)</td>
<td>3.6 (0.1)</td>
<td>.001</td>
<td>.04</td>
</tr>
<tr>
<td>Test anxiety†</td>
<td>3.5 (0.1)</td>
<td>2.9 (0.1)</td>
<td>2.5 (0.1)</td>
<td>&lt;.0001</td>
<td>.13</td>
</tr>
<tr>
<td>Amotivation†</td>
<td>1.7 (0.1)</td>
<td>1.3 (0.1)</td>
<td>1.2 (0.1)</td>
<td>&lt;.0001</td>
<td>.07</td>
</tr>
</tbody>
</table>

* Measured by a modified version of the AMS; range of scores = 1 to 5
X Measured by the MSLQ; range of scores = 1 to 5
**The reporting least square means (LSMs) are adjusted for gender and year level
** P values from MANCOVA
xx Effect sizes from partial Eta squared: Small = 0.01–0.06, Medium = 0.06–0.138, Large > 0.138 (110)

Post hoc mean comparisons were statistically significant (P < .05) (Table 8.4). The Higher Burnout Lower QOL students had higher AM and test anxiety and lower IM and self-efficacy compared with the other profiles. For the Higher Burnout Lower
QOL compared with Moderate Burnout Moderate QOL and Lower Burnout Higher QOL, the mean differences in IM scores were −0.3 (0.1) and 0.3 (0.1), differences in AM scores were 0.3 (0.1) and 0.5 (0.01), differences in SE were −0.3 (0.1) and −0.4 (0.1), and differences in test anxiety were 1.0 (0.1) and 1.0 (0.1) respectively.

Table 8.4 Post hoc comparisons of burnout and QOL between profiles only, including significant dimensions of the domain

<table>
<thead>
<tr>
<th>Academic Motivation</th>
<th>Comparisons Between Profiles</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>P Value*</th>
<th>95% Confidence Interval for Difference*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic Motivation</td>
<td>HBLQ vs LBHQ</td>
<td>−0.3</td>
<td>0.1</td>
<td>.004</td>
<td>(−0.6, −0.1)</td>
</tr>
<tr>
<td>Amotivation</td>
<td>HBLQ vs MBMQ</td>
<td>0.3</td>
<td>0.1</td>
<td>.008</td>
<td>(0.1, 0.5)</td>
</tr>
<tr>
<td></td>
<td>HBLQ vs LBHQ</td>
<td>0.5</td>
<td>0.1</td>
<td>.000</td>
<td>(0.2, 0.7)</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>HBLQ vs MBMQ</td>
<td>−0.3</td>
<td>0.1</td>
<td>.027</td>
<td>(−0.5, −0.0)</td>
</tr>
<tr>
<td></td>
<td>HBLQ vs LBHQ</td>
<td>−0.4</td>
<td>0.1</td>
<td>.001</td>
<td>(−0.6, −0.1)</td>
</tr>
<tr>
<td>Test Anxiety</td>
<td>HBLQ vs MBMQ</td>
<td>1.0</td>
<td>0.1</td>
<td>.000</td>
<td>(0.3, 1.0)</td>
</tr>
<tr>
<td></td>
<td>HBLQ vs LBHQ</td>
<td>1.0</td>
<td>0.1</td>
<td>.000</td>
<td>(0.6, 1.3)</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the .05 level
* Adjustment for multiple comparisons: Bonferroni

In reference to the differences in progress test scores, the results of the repeated measures ANCOVA showed a significant time effect between profiles (p = .03) (Figure 8.1). The Higher Burnout Lower QOL students scored significantly lower on the third (end of year) progress test when compared with the Lower Burnout Higher QOL and Moderate Burnout Moderate QOL profiles. The magnitude of this effect was small.
Discussion

The aim of this study was to determine the associations between burnout and QOL, academic motivation and achievement. By taking a person-oriented approach, this study found that medical students display specific profiles of burnout and QOL that are associated with differences in academic motivation and progress test scores over time.

Similar to previous findings in the medical education literature, differences in burnout and QOL between year levels of the medical curriculum were found (11, 172). The findings in this study showed that students in their early stages of medical education were over-represented in the Higher Burnout Lower QOL profile. The students in this profile had the least desirable type of academic motivation, with lower IM and self-efficacy, higher AM and test anxiety and lower scores on progress tests over time.

In comparison, students in the Lower Burnout Higher QOL profile had a more optimal motivational orientation, with higher IM and self-efficacy and lower test anxiety and
AM. These findings are consistent with the study by Park et al (73), who reported that psychological distress positively correlates with AM and negatively correlates with IM and achievement. Henning et al (14) also reported that poorer QOL is associated with lower achievement and positively correlated with test anxiety. Thus, the present study presents further evidence of the effects of psychological distress and poor QOL on academic motivation and achievement among specific subgroups of medical students.

To the author’s knowledge, this is the first study in medical education that classifies students according to burnout and QOL profiles. Generating these profiles using a person-oriented approach yielded complementary information to studying burnout and QOL as group variables. The present study builds on previous research that used group variables, by providing an insight into the many facets of QOL and burnout experienced by students. For example, if students are experiencing burnout, then it is highly likely that their psychological QOL will suffer. Similarly, poor physical QOL may be detrimental to social QOL. As burnout, psychological distress and QOL have been found to be integrally linked, it seems logical from both a research and a pastoral care perspective to consider them together rather than in isolation. The implications of this approach may be customising pastoral support activities to employ a broader repertoire of wellness promotion practices to address, not only burnout, but also the wider QOL issues that students often face.

It would be beneficial as part of a future research agenda to investigate whether the different profiles would benefit from different ways of providing support and mentoring during their medical study. It would be of interest to find out whether these profiles remain stable during medical study or change according to the learning environment and experience. A longitudinal study design to study these aspects would be ideal.
Conclusion

This study has demonstrated an important relationship between burnout and QOL profiles, academic motivation and achievement on progress tests over time. Lower Burnout Higher QOL students had more optimal academic motivation with higher IM and self-efficacy and lower AM and test anxiety. Higher Burnout Lower QOL students had the least desirable type of academic motivation, with lower IM and self-efficacy and higher AM and test anxiety. Students in this profile also had lower academic achievement on progress tests over time.
CHAPTER 9

Conclusions and future directions
Summary of Results

The aim of this thesis was to determine the impact of a medical curriculum on motivation and well-being, and how these constructs are associated with academic achievement among medical students. In order to address this research aim, a multi-methods approach incorporating a systematic review and quantitative and qualitative studies was undertaken, including systematically reviewing the literature for motivation and well-being among medical students; exploring motivation and well-being by year level of a curriculum and admissions criteria; evaluating the effect of a medical curriculum on motivation and well-being over time; systematically reviewing assessment methods; evaluating a change of medical curriculum on motivation and well-being; and assessing associations between motivation, well-being and academic achievement.

This thesis started with a systematic review (Chapter 2) to summarise and critically appraise the literature regarding motivation and well-being during undergraduate medical education. Its findings demonstrated significant associations between motivation (including IM, EM, AM, self-efficacy and self-regulation) and well-being (including QOL, stress, anxiety or exhaustion), which were found to be moderated by demographic and curriculum influences. Furthermore, the review indicated that a relationship exists between motivation, well-being and academic achievement. However, it identified gaps in the literature on these issues and therefore established a need for further research into its findings.

Chapter 3 qualitatively explored medical students’ views about their motivation for attending medical school and their motivation and QOL during their undergraduate training. Clear differences in student expression were noted between admissions criteria and year level, revealing that the role of family/whānau and cultural values
more heavily influenced MAPAS students’ perceptions of motivation and QOL compared with non-MAPAS students. The student commentaries also revealed that the clinical learning environment had more of an effect on Year 5 student motivation and QOL relative to their Year 2 peers. Furthermore, the student commentaries suggested that the curriculum was a mediator of motivation and QOL during their medical school experience.

Chapter 4 elaborated further on the findings of Chapter 3 by evaluating longitudinal changes in motivation, burnout and QOL across year levels of a curriculum and how these changes may differ by admissions criteria. Its findings indicated that students in Year 2 experienced higher burnout and lower self-efficacy and QOL compared with ascending year levels, whereas Year 4 and 5 had higher AM and EM than Year 2. In relation to admission criteria, students admitted under Regional Rural Admission and MAPAS had higher mean scores for test anxiety and social QOL than students admitted under General Admission. Students admitted under MAPAS also had higher mean scores for EM and burnout and lower physical and environmental QOL mean scores than General Admission and Regional Rural Admission students. These trends were consistent across year levels. This study concluded that changes in motivation, burnout and QOL occur longitudinally, and also vary by admission criteria.

Chapter 5 considered potential differences in motivation and well-being based on a subgroup analysis of ethnicity. Its results highlighted differences in QOL and academic motivation among indigenous and ethnic minority medical students. Pacific students reported higher levels of EM, test anxiety and social QOL in comparison with other ethnic groups. NZ European students generated higher scores for physical, psychological and environmental QOL. Asian students scored lowest on social QOL, and Māori and Pacific students scored lowest on
environmental QOL. This study concluded that along with sociodemographic influences, the medical school curriculum may be influencing motivation and QOL for indigenous and ethnic minority students.

Prior to an investigation of the effect of a revised curriculum in Chapter 7, Chapter 6 presented a systematic review that evaluated how specific curriculum factors (assessment methods) may be impacting on student well-being. It showed that assessment invokes stress or anxiety, perhaps more so for female medical students. Its findings also indicated that a relationship may exist between assessment stress or anxiety and impaired performance.

Building on the findings of Chapter 6, Chapter 7 described a study that determined the impact of a change in curriculum and the implementation of progress testing on motivation, burnout and QOL. This study found no statistically significant differences between cohorts of medical students under traditional and revised curricula. However, differences were found when comparing pre-clinical medical students and students in their clinical years of training. Curriculum factors were associated with small but statistically significant differences in physical and environmental QOL for Year 4 medical students. These findings suggest that changes in a curriculum may have had a differential effect on medical student motivation and QOL, particularly for those students in the latter years of medical school who are based in a clinical learning environment.

Finally, Chapter 8 used a person-oriented methodology and identified associations between motivation, burnout, QOL and academic achievement. It identified three profiles – Higher Burnout Lower QOL, Moderate Burnout Moderate QOL and Lower Burnout Higher QOL – and found that the Higher Burnout Lower QOL profile had lower IM and self-efficacy scores and higher AM and test anxiety scores. The HBLQ
profile also scored lower on the third (end of year) progress test when compared with the other profiles.

Based on these findings, a conceptual model that integrates processes that underpin motivation, well-being, and academic achievement is presented in Figure 9.1. The variables in the model are not considered mutually exclusive, but rather represent dynamic interactions between motivation, well-being, and academic achievement within the medical curriculum as well as wider sociocultural influences.

Not only does the model aim to integrate the findings of this research but the hope is it engenders future research and the development of interventions to support student motivation and well-being.

Figure 9.1 A conceptual model integrating relationships between sociocultural influences and medical curriculum factors, with motivation, well-being, and academic achievement.
Implications

These findings and the variables and processes proposed within the conceptual model have implications for the recruitment and retention of medical students, curriculum development, teaching and learning methods, and student support services.

Recruitment and entry into medical school

In line with SDT, the current research suggests that medical students enter medical school with motivation that is mostly intrinsic and autonomous, that is, out of interest, or because of the challenge or opportunities for learning and enjoyment and because of personal values and beliefs such as helping others. On the other hand, students also enter medical school with extrinsic and controlled motivation – out of concern for future financial prospects and job security. Additional factors such as the whānau, exposure to role models, and cultural values and beliefs were identified as playing a role, particularly among MAPAS students. With this in mind, programmes that aim to recruit more Māori and Pacific students into the health professions should consider the continuum of motivation and the additional factors that have been identified from this research as playing a role in their motivation to attend medical school.

The qualitative research from Chapter 3 reported that role models provided students with the opportunity to view and be exposed to life within the medical profession, which provided motivation to pursue a career in medicine, particularly for MAPAS students. Similar opportunities could be provided through vocational guidance and mentorship support prior to and during the early years of medical school. Such initiatives could support student motivation through providing insight, guidance and strategies to succeed during medical school, and also increase awareness of the value of becoming a part of the medical profession.
Once entered into medical school, it is possible that students find it difficult to reconcile their motivational orientation with the demands of the medical school programme, for example, striking a balance between gaining medical knowledge to satisfy IMs while reconciling the pressures of workload and assessments – both sources of EM. An imbalance can lead to a loss of autonomy in learning, and therefore undermine IM (33). Mentorship could support these students to regain autonomy in their learning, by guiding their study approaches in accordance with their intrinsic interests, while balancing workload and assessment demands.

Curriculum design and teaching and learning methods

The curriculum of the early years of medical school often deals primarily with basic science concepts that are not directly related to clinical practice (173). Medical students may therefore become demotivated because of the misalignment between learning basic sciences and the reasons they pursue medicine, such as patient contact (33). However, more autonomous forms of motivation can be fostered when the value of learning basic sciences can be integrated into the curriculum through a clinically oriented approach and early patient contact. This can be supported by horizontal and vertical integration within the curriculum, student-centred education, problem-based learning, learning in small groups and student-directed electives, which have all been shown to support IM (33, 174-176).

The evidence in this thesis suggests that medical schools must design their curricula with a focus not just on the medical content but also taking into account students’ lives, as this research and wider evidence strongly informs us that the learning environment and curricula have a direct impact on motivation and QOL (8, 11). Although one could argue that physical, social and environmental QOL are not the sole remit of the medical school, these dimensions of QOL and study-life balance are largely impacted by the medical school curriculum around workload, assessment
and time commitment. If medical schools addressed these facets of their curricula, a portion of modifiable risk could be addressed.

Another possibility for addressing risk and improving QOL is to develop medical students’ resilience through specific content and activities designed throughout the curriculum (177). A positive step forward has been the health and well-being curriculum stream recently incorporated into the University of Auckland medical programme (18). However, this research was unable to determine its effectiveness due to the multitude of other changes that were implemented at the same time.

In addition to a health and wellbeing curriculum stream, several other wellness programmes could be considered and promoted in medical schools, such as physicians educating medical students about health issues and relaxation strategies, both of which can play a role in building resilience and coping mechanisms (178).

Within the clinical learning environment, the sense of belonging and support provided by the clinical team was highlighted within the current research. However, the lack of sustained relationships among students and clinicians can undermine social supports and the development of IM (33, 179). To address these challenges, longitudinal integrated clerkships could be considered in curriculum reforms. This is one example of a strategy that aims to restore continuity in clinical training and foster deeper relationships between students and the clinical team that can support IM (33, 180).

**Student support services**

To mitigate the intensity of the academic workload and assessments, it is important to encourage students to seek support and assistance (11, 181). This is particularly pertinent for Māori and Pacific students, for whom the current findings have shown differences in levels of burnout and QOL. In addition to support provided by the MAPAS programme, support services could include teaching study skills and time
management, and providing resources that assist with problem solving and development of clinical reasoning. The use of peer support or a mentor could also be provided by student services (182). Such an approach can foster positive relationships, social support, and psychological wellness (183).

Higher test anxiety scores and lower self-efficacy scores were also found among the Pacific medical students in this research. As a first step, it would be helpful to determine the type of assessment anxiety that these students are experiencing, and to design corresponding interventions to reduce the negative consequences of such anxiety and to foster self-efficacy. For example, utilising senior medical students in tutor roles has helped Māori medical students gain confidence, self-belief and reduced anxiety while preparing for an OSCE (34). This form of support could be applicable for Pacific students. Support could also take the form of skills training in test taking and anxiety management, and provision of appropriate academic, pastoral and psychological support to students who require it.

**Limitations and future research**

There are several limitations to this research. Firstly, sources of bias, such as self-selection bias, may be present in this research. This is pertinent also for the qualitative aspect of the current research in which a self-selection bias may exist among focus group participants.

A response bias is another potential bias within this research, given the cultural differences in responding to survey studies that have previously been documented. For example, Asian students have been found to be more conservative when responding to questionnaires that request information about themselves, therefore potentially influencing the differences in motivation and QOL scores observed in this research (40).
Another potential response bias is socially desirable reporting in which participants report a socially desirable behaviour when questioned. The potential impact of both self-selection and response biases on study findings were not controlled for.

Secondly, as these data were observational, the associations observed are not necessarily causal and could change in the long term. Future research is needed across multiple cohorts to test the reproducibility of results over time.

Within the qualitative study, it is acknowledged that the study sample is not reflective of all medical students. However, the themes identified may be common among many medical students, both locally and internationally.

Furthermore, using two existing frameworks of QOL (54) and motivation (3) as a starting point for focus group discussions could be perceived as providing a narrow view, particularly across cultures (184). However, it is also important to note that discussions were broadened beyond these frameworks.

These studies were conducted at a single academic institution, and therefore may not be generalisable to the wider medical student population. In addition, the focus groups of Year 5 students were conducted at one clinical site, the South Auckland Clinical Campus. It would have added transferability to the findings had further views from students across multiple clinical sites been obtained. Future research is needed across multiple institutions to determine whether the findings described in the current research are also found in other settings.

*Future directions*

This thesis has generated several interesting research questions that as yet remain unanswered.
Curriculum and assessment methods

Following the introduction of the revised curriculum, this research showed a small but significant increase in physical and environmental QOL scores for Year 4 students. Interestingly, a study by Chen et al (162) showed fluctuations in student stress scores measured at three time points during the implementation of progress testing. These findings suggest that the effects of the revised curriculum and progress testing on student well-being can change over time. This is pertinent as this research encompassed students in the first phase of implementation, that is students entering the revised curriculum from Year 2 and Year 4 in 2013. Further research is needed on future cohorts of medical students to determine the long-term impact of the revised curriculum and progress testing on student motivation and well-being.

Another avenue for future research relates to a current lack of research comparing differences between high-stake or low-stake assessments, and formative or summative testing, on medical student motivation and well-being. The research that is available is also limited by short follow-up durations and does not include information on the effect of ongoing exposure to assessment over the long term. Therefore, further research is needed to address these questions.

Measures of motivation and well-being

The survey utilised in this research was adapted from measures of motivation, burnout and QOL developed internationally. Although these measures have been previously used among New Zealand medical students, there is scope for drawing on the findings of this research to potentially develop or adapt questionnaires for measuring motivation and QOL among medical students more specific to the NZ context, which are currently lacking. In contrast, QOL questionnaires have been validated among the NZ medical student population (71).
Person-oriented research approaches

It would be beneficial as part of a future research agenda to investigate whether burnout and QOL profiles identified through this research remain stable over time. Therefore, a longitudinal study design is needed to study this aspect of profiling.

Future clinical practice

Previous evidence has suggested that distress within the medical profession originates during medical school (185). A longitudinal study is needed to track students’ health and well-being during medical school and on into their practising lives as doctors.

As part of a future research agenda, it would also be interesting to determine whether motivation and well-being during medical school influences future clinical practice.

Conclusions

Based on the studies presented above, the following conclusions can be drawn:

Multiple motivational orientations exist among medical students. On the one hand, motivation is mostly intrinsic and autonomous, that is, out of interest, challenge or opportunities for learning and enjoyment and because of personal values and beliefs such as service and helping others. On the other hand, motivation is also extrinsic and controlled – out of concern for future financial prospects and job security. The factors impacting on motivation and well-being among medical students include course workload, assessment related stressors, grades, exhaustion, sleep deprivation, and the sacrifices made for their studies. However, a sense of purpose and belonging, satisfaction and enjoyment, and family support can contribute to their motivation and well-being.

Differences in motivation and well-being exist among medical student cohorts with the most significant differences being between year levels, admissions criteria, and
ethnicity. These differences suggest that a medical curriculum has a differential effect on motivation and well-being, especially for students in their early years of medical school, for those who enter through alternative admissions pathways, and for indigenous and ethnic minorities.

In the context of a change in curriculum, there are no overall differences in motivation and well-being between traditional and revised curricula. However, differences are found between the two curricula during the clinical years of medical school.

There is an association between motivation, well-being and academic achievement. Students with a lower burnout and higher QOL profile have higher intrinsic motivation and self-efficacy, and lower amotivation and test anxiety. These students also have higher PT scores over time.

Taken together, the findings of this research suggest that a medical curriculum has an impact on motivation and well-being, that differs by year level, admissions criteria, and ethnicity. A relationship also exists between motivation and well-being, and academic achievement.


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## Appendix 1: Table of Covariates for the Longitudinal Analyses

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<td>&lt;.0001</td>
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</tbody>
</table>
Appendix A: Study Questionnaire

Motivation for Learning and Well-being Questionnaire

The questionnaire is split into 2 sections, consisting of 6 pages:

Section 1: will ask for information about you.
Section 2: is split into sections 2A and 2B, and will ask you for your opinions.

University ID number: (Please state) ______________________
Year level at medical school: (Please state) __________________
Cohort Site (if applicable): (Please state) ___________________

<table>
<thead>
<tr>
<th>1. Gender? (Please circle)</th>
<th>2. What is your age? (Please state)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
</tr>
</tbody>
</table>

3. Secondary school(s) attended: (Please state): __________________________________________

4. What is your route of entry to medical school? (Please circle)
   - Overlapping Year 1
   - Graduate entry
   If Graduate entry, please state your previous degree(s): __________________________________

5. Under which admission scheme did you apply? (Please circle)

| General Admission | MAPAS | Rural Regional Admission Scheme | International |

6. What is your current enrolment status? (Please circle)
   - Domestic student
   - International student
7. Which ethnic group do you belong to?  
(Mark the space or spaces that apply to you).

☐ NZ European  
☐ Māori  
☐ Samoan  
☐ Cook Island  
☐ Tongan  
☐ Niuean  
☐ Chinese  
☐ Indian  
☐ Other such as DUTCH, JAPANESE, TOKELAUAN. (Please state): __________________________

8. From all of your sources of income, what will your total income be for the period January 1st 2013 to December 31st 2013? (that you yourself got, before tax or anything was taken out of it).

(Please state): __________________________

9. What is your total level of debt from all sources? Eg. Government Student Loan, overdraft, credit cards, bank loan etc. EXCLUDE MORTGAGES

(Please state): __________________________

10. What is your total level of debt from the Government Student Loans Scheme?  
(Please state): __________________________

11. How much do you worry about your debt? (Please circle)

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
</table>

12. What is your current partnership status? (Please circle)

<table>
<thead>
<tr>
<th>Single</th>
<th>Couple/ De facto</th>
<th>Married/ Civil Union</th>
<th>Divorced</th>
<th>Widowed</th>
</tr>
</thead>
</table>

13. Do you have financial dependents?  
(A person who relies on you as a primary source of income). Please circle

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>
If Yes, please state (eg children, spouse):

14. What is your parent(s)’ occupation? (Please state):

Parent 1: ___________________ Parent 2: ___________________

15. Where do you live at present? Mark the space that applies to you

- Privately rented flat
- Own home
- In Partners home
- Parental home
- Other. (Please state):

16. What specialty do you wish to go into on completion of your medical degree and after internship? (Please state):

SECTION 2A

Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to medical school.

Does not correspond at all 1 2 3 4 5 Corresponds Exactly

WHY DO YOU GO TO MEDICAL SCHOOL?

1. Because with only a high-school qualification I would not find a high-paying job later on. 1 2 3 4 5

2. Because I experience pleasure and satisfaction while learning new things. 1 2 3 4 5

3. Because I think that a medical school education will help me better prepare for the career I have chosen. 1 2 3 4 5

4. For the intense feelings I experience when I am communicating my own ideas to others. 1 2 3 4 5

5. Honestly, I don't know; I really feel that I am wasting my time in medical school. 1 2 3 4 5

6. For the pleasure I experience while surpassing myself in my medical studies. 1 2 3 4 5

7. To prove to myself that I am capable of completing my medical school degree. 1 2 3 4 5

8. In order to obtain a more prestigious job later on. 1 2 3 4 5
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9. For the pleasure I experience when I discover new things never seen before.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Because eventually it will enable me to enter the job market in a medical field that I like.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. For the pleasure that I experience when I read interesting medical subjects.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I once had good reasons for going to medical school; however, now I wonder whether I should continue.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. Because of the fact that when I succeed in medical school I feel important.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. Because I want to have &quot;the good life&quot; later on.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. For the pleasure that I experience in broadening my knowledge about medical subjects which appeal to me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. Because this will help me make a better choice regarding my medical career.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. For the pleasure that I experience when I feel completely absorbed by what certain authors have written.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. I can't see why I go to medical school and frankly, I couldn't care less.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. To show myself that I am an intelligent person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. In order to have a better salary later on.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. Because my medical studies allow me to continue to learn about many things that interest me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. Because I believe that a few additional years of medical education will improve my competence as a worker.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. For the &quot;high&quot; feeling that I experience while reading about various interesting medical subjects.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. I don't know; I can't understand what I am doing in medical school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. Because it allows me to experience a personal satisfaction in my quest for excellence in my medical studies.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. Because I want to show myself that I can succeed in my medical studies.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Using the scale below, please rate the following items based on your behaviour in this course.
Not at all true of me 1 2 3 4 5 Very true of me

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>29. I believe I will receive an excellent grade in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30. I’m certain I can understand the most difficult material presented in the readings for this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31. I’m confident I can understand the basic concepts taught in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>32. I’m confident I can understand the most complex material presented by the lecturer in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>33. I’m confident I can do an excellent job on the assignments and tests in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34. I expect to do well in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35. I’m certain I can master the skills being taught in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>36. Considering the difficulty of this course, the lecturer, and my skills, I think I will do well in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>37. When I take a test I think about how poorly I am doing compared with other students.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>38. When I take a test I think about items on other parts of the test I can’t answer.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>39. When I take tests I think of the consequences of failing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>40. I have an uneasy, upset feeling when I take an exam.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>41. I feel my heart beating fast when I take an exam.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

SECTION 2B
This questionnaire asks how you feel about your quality of life, health, and other areas of your life. Please answer all the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can be your first response. Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the last two weeks.

<table>
<thead>
<tr>
<th></th>
<th>Very Poor</th>
<th>Poor</th>
<th>Neither Poor nor Good</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>42. How would you rate your quality of life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
The following questions refer to **how often** you have felt or experienced certain things in the last two weeks.

<table>
<thead>
<tr>
<th>Question</th>
<th>Never</th>
<th>Seldom</th>
<th>Quite Often</th>
<th>Very Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>43. How often do you feel weak and susceptible to illness?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>44. How often do you feel tired?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>45. How often are you physically exhausted?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>46. How often do you have negative feelings such as blue mood, despair, anxiety or depression?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47. How often do you think: “I can’t take it anymore?”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>48. How often are you emotionally exhausted?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>49. How often do you feel worn out?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The following questions ask about **how much** you have experienced certain things in the last two weeks.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>50. To what extent do you feel that physical pain prevents you from doing what you need to do?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>51. How much medical treatment do you need to function in your daily life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>52. How much do you enjoy life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>53. To what extent do you feel your life to be meaningful?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>54. How well are you able to concentrate?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>55. How safe do you feel in your daily life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>56. How healthy is your physical environment?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>57. To what extent do you have feelings of belonging?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
The following questions ask about **how completely** you have experienced or were able to do certain things in the **last two weeks**. Circle your best answer number.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>58. Do you have enough energy for everyday life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>59. Are you able to accept your body appearance?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>60. Have you enough money to meet your needs?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>61. How available to you is the information you need in your day-to-day life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>62. To what extent do you have the opportunity for leisure activities?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>63. How well are you able to get around physically?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The following questions ask about **how good or satisfied** you have felt about aspects of your life over the **last two weeks**.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>64. How satisfied are you with your health?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>65. How satisfied are you with your sleep?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>66. How satisfied are you with your ability to perform your daily living activities?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>67. How satisfied are you with your capacity for work?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>68. How satisfied are you with yourself?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>69. How satisfied are you with your personal relationship?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>70. How satisfied are you with your sex life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>71. How satisfied are you with the support you get from your friends?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>72. How satisfied are you with the conditions of your living place?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>73. How satisfied are you with your access to health services?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>74. How satisfied are you with your transport?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Thank you for completing the questionnaire.**
Appendix B: Focus Group Questionnaire

Focus Group Questionnaire
Exploring the Motivation and Well-being of New Zealand Medical Students.

Principal Investigator:
Professor Andrew G. Hill
Head of South Auckland Clinical School

Student ID Number:___________________
Gender:____________________________
Ethnicity:____________________________

1. What was your motivation for enrolling in medical school as a study of choice? Was this your first choice?

2. What are your values, beliefs, or specific cultural practices that influence your decision about going to medical school?

3. What is your family’s role in influencing your decision to go to medical school?

4. How are your thoughts about future prospects (ie lifestyle, income, debt, prestige, career intention) influencing your decision about going to medical school?

5. How do assessments and grades during medical school influence your intention to continue at medical school?

6. How confident are you that you will receive excellent grades at medical school?

7. If you get a good grade at medical school, who do you tell?

8. Is medical school satisfying and enjoyable? Is it interesting and meaningful? Why?

9. What factors dissuade you from going to medical school?

10. How often are you exhausted from going to medical school? How does this influence your decision to attend class? How does this influence your intention to attend medical school?

11. How does medical school impact on your quality of life? How does this influence your decision to attend medical school?

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE on 16/08/13 FOR 3 YEARS, Reference number 9827
Appendix C: Participant Information Sheet and Consent Form – Quantitative studies

Participant Information Sheet

– Student Participants

Motivation and Well-being In New Zealand Medical Students.

Principal Investigator

Professor Andrew G. Hill Head of South Auckland Clinical School The University of Auckland

Introduction: You are invited to participate in a research study ‘Motivation and Well-being in New Zealand Medical Students’.

About the Study: This is a study to determine motivation for learning and well-being in medical students.

Procedures: You will complete a questionnaire on two occasions (2014 and 2015). Each questionnaire will take approximately 10-15 minutes to complete. Therefore, a total time of about 20-30 minutes will need to be given by study participants over a two year period. These questionnaires will be completed at the end of a lecture or teaching session. You will be required to write your student ID numbers on each questionnaire. This is required so we can match you to each questionnaire that you complete. We will also retrieve your progress testing grades to enable comparison between your responses from this questionnaire and your progress testing grades.

Data collected from this study will be analysed and findings used for the purpose of future publication in medical journals and public presentations. The data collected may also be used toward a doctoral thesis (PhD) by Dr Mataroria Lyndon.

Benefits: Students may benefit in future from potential improvements in the medical programme design and learner support as a result of knowledge gained from this study.

Risks: In the event of experiencing psychological distress from taking part in this study please contact Dr Marcus Henning (m.henning@auckland.ac.nz) for further support and referral for counselling if required.

Compensation: No tangible compensation will be given. A copy of the research results will be available at the conclusion of the study from Dr Mataroria Lyndon (mlyn027@aucklanduni.ac.nz).

Confidentiality: Any personal information that is obtained during this study will be kept confidential. Only the researchers will have access to the data. No information which could be used to identify study participants will be used in final reports from this study.

Voluntary Nature of the Study: Participation in this study is strictly voluntary. Your Phase Director has given assurance that neither your grades nor academic relationships with members of staff within the School of Medicine, University of Auckland, will be affected by participating or not participating in this study.

Participants’ Right to Withdraw: Participants who wish to withdraw from participation in this study will have this right respected. They have the right to withdraw from this study at any time and they
will not have to provide a reason for this decision. Participants may request to have data they provide for this study withdrawn up until one month after completion of the third total questionnaire which is to be administered in 2014. At this point in time, data provided by the participants will not be able to be withdrawn from this study. To withdraw from this study, participants can contact Dr Mataroria Lyndon (mlyn027@aucklanduni.ac.nz).

**Data Storage and Destruction:** All data (hard copy and digital) will be stored securely in locked cabinets and on password-protected computers at the South Auckland Clinical School for six years from the time the study is completed. Consent forms will also be securely stored separately from data at the South Auckland Clinical School for six years. At the end of this period, the data and consent forms will be deleted or destroyed by commercial document destruction services.

**Points of Contact:** If you have any questions or comments regarding this study, please contact the Principal Investigator, Professor Andrew Hill (email: a.hill@auckland.ac.nz).

**Investigators’ Contact Details**

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Department/Position</th>
<th>Phone Numbers</th>
<th>Email Address</th>
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<tr>
<td>Professor Andrew G. Hill</td>
<td>Department of Surgery, South Auckland Clinical School</td>
<td>(09) 276 0076 ext 8428 or 2100</td>
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<td>Dr Susan Hawken</td>
<td>Department of Psychological Medicine</td>
<td>(09) 373 7599 ext 82588</td>
<td><a href="mailto:s.hawken@auckland.ac.nz">s.hawken@auckland.ac.nz</a></td>
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<tr>
<td>Dr Mataroria Lyndon (Ngati Hine, Ngati Whatua, Tainui)</td>
<td>Department of Surgery, South Auckland Clinical School</td>
<td>(09) 276 0076 ext 2864</td>
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</tbody>
</table>

**Head of Department Contact Details**

**Associate Professor Ian Bissett,** Department of Surgery

(09) 373 7599 ext 89821; i.bissett@auckland.ac.nz

**Ethical Approval**

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142.

Telephone 09 373-7599 ext. 87830/83761.

Email: humanethics@auckland.ac.nz

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON SEPTEMBER 4th 2012 FOR (3) YEARS, Reference number 8467
**Consent Form** – Student Participants

This form will be held for a period of six years.

**Motivation and Well-being In New Zealand Medical Students.**

**Principal Investigator**

Professor Andrew G. Hill  Head of South Auckland Clinical School  The University of Auckland

**Informed Consent**

I have read the study Participant Information Sheet and understand what this study entails. I have had the opportunity to ask questions and have them answered to my satisfaction.

I understand that this study involves completing a questionnaire on multiple occasions (2014 and 2015). Each questionnaire will take approximately 10-15 minutes to complete. Therefore, a total time of about 20-30 minutes will required for participation in this study over a two year period.

I understand that my university ID number is required on each questionnaire to match me to each questionnaire that I complete.

I understand that my progress testing grades will be obtained for the purposes of this study.

I understand that data collected from this study will be analysed and findings used for the purpose of future publication in medical journals and public presentations. The data collected may also be used toward a doctoral thesis (PhD).

I understand that all personal information that is obtained during this study will be kept confidential. All results will be de-identified prior to data analysis and that no information which could identify me will be used in final study reports.

I understand that participation in this study is voluntary and I have the right to withdraw from participating at any time. I may request to have data I have provided for this study withdrawn up until one month after completion of the third total questionnaire which is to be distributed in 2014. At this point in time, my data will not be able to be withdrawn from this study.

I understand that the Phase Director has assured that neither my grades nor academic relationships with members of staff within the School of Medicine, University of Auckland, will be affected by participating or not participating in this study.

I understand in the event of experiencing psychological distress from taking part in this study I can contact Dr Marcus Henning (m.henning@auckland.ac.nz) for further support and referral for counselling if required.

I understand that the study data and the study consent forms will be stored separately and securely for six years at the South Auckland Clinical School, Middlemore Hospital, from the time this study is completed. After this time, it will be appropriately destroyed.

**Name:** ______________________________________________________

**Signature:** ____________________________________________________

**Date:** _________________________________________________________

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 04/09/12 FOR 3 YEARS, Reference number 8467
Appendix D: Participant Information Sheet and Consent Form – Qualitative studies

**Participant Information Sheet**

- Focus Group Participants
- This form will be held for a period of six years.

Exploring the Motivation and Well-being of New Zealand Medical Students.

**Principal Investigator**

Professor Andrew G. Hill
Head of South Auckland Clinical School

**Introduction**

The relationship between motivation for learning and well-being in medical students is previously established. However, little is known about how demographic variables such as ethnicity, impact on this relationship. Therefore, this study aims to contribute knowledge in this area by exploring the interactions between medical students’ motivation for learning, well-being, and ethnicity.

If you have previously completed a survey (Motivation for Learning & Well-being in NZ Medical Students), we would like to invite you to participate in a focus group. Focus groups will take place from 3pm Monday 21st October at Grafton Campus and from 2pm Wednesday 23rd October at MAPAS Fale.

Your participation would be greatly appreciated. Please contact Mataroria Lyndon by email (mlyn027@aucklanduni.ac.nz) if you are interested in participating.

**About the Study**

Eight focus groups will conducted by a PhD student (Mataroria Lyndon), and a co-investigator (Marcus Henning). Each focus group will consist of a single subgroup of medical students (ie Māori, Pacific, Asian, NZ European) at different phases of medical training (year two and year four). Focus groups will take place outside of class time to minimise disruption to your formal learning. Each focus group is expected to be 60 to 120 minutes in duration.

During the focus group you will brainstorm and discuss various topics relating to your motivation and well-being at medical school. You will have the chance to interact with other focus group participants and the facilitators of these focus groups. Refreshments will also be provided.

**Risks and Benefits**

**Benefits**

Students can benefit in future as a result of this study’s findings, which may promote a greater understanding of the student experience of medical training. This study’s findings will likely assist with developing initiatives in relation to enhancing medical curricula, promoting academic and learning support, and ensuring adequate pastoral assistance for students.

Data collected from this study will be analysed and findings used for the purpose of future publication in medical journals and public presentations. The data collected may also be used toward a doctoral thesis (PhD) by Dr Mataroria Lyndon. You can obtain a copy of the study results after its completion.
You can indicate this option in the appropriate section of this study’s consent form. Your contact details (postal address or email address) will be required if you would like a copy of this study’s results.

**Risks and Ethical Considerations**

Informed Consent: Participation in this study is entirely voluntary. Prospective participants will be given all the relevant information regarding the purpose, methods and procedures of this study and will have the opportunity to discuss these with study investigators. Written consent will be obtained from all study focus group participants. The Phase Director (Roger Booth) has given assurance that neither grades or academic relationships with members of staff within the School of Medicine, University of Auckland, will be affected by students participating or not participating in this study.

Participants’ Right to Withdraw: Participants will have the opportunity to withdraw information not relevant to the study (such as any inappropriate language, identifiable information, etc.) during each focus group. Participants also have the right to withdraw from this study at anytime. They can choose to leave the focus group or not to answer any questions. They will not have to provide a reason for their decision to withdraw.

Confidentiality: Focus group participants in this study will be asked to respect the confidentiality of other participants and the discussions that take place in the focus group. The identity of all study participants will be kept confidential by this study’s investigators. A confidentiality agreement will also be completed by the research assistant. Data will be de-identified prior to analysis. No information that could lead to the identification of study participants will be used in any study reports.

The participants will be audio taped with a digital voice recorder, which will be transcribed by a research assistant. Participants will not be offered the tapes or digital files of their recording nor the opportunity to edit the transcripts. In the unlikely event of participants becoming psychologically distressed from taking part in the focus groups, they may be referred to the University of Auckland Student Counselling Services.

Data storage and destruction: All data collected will be securely stored at the South Auckland Clinical School for six years from the time this study has been completed. After this time, computer files containing study data will be deleted and paper documents such as Consent Forms will be deposited into commercial document destruction bins.

**Investigators’ Contact Details**

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<td>Dr Mataroria Lyndon          (Ngati Hine, Ngati Whatua, Tainui).</td>
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**Head of Department Contact Details**

Associate Professor Ian Bissett, Department of Surgery

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**Ethical Approval**

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Email: humanethics@auckland.ac.nz
Consent Form – Focus Group Participants

This form will be held for a period of six years.

Exploring the Motivation and Well-being of New Zealand Medical Students.

Principal Investigator
Professor Andrew G. Hill
Head of South Auckland Clinical School

Informed Consent

I have read the study Participant Information Sheet and understand what this study involves. I have had the opportunity to ask questions and have them answered to my satisfaction.

I understand that I will participate in a focus group that will discuss and brainstorm on the topic of motivation for learning and well-being of medical students. It is expected to take about 60-90 minutes of my time.

I agree not to disclose the identity of other focus group participants nor information discussed in the focus group. I understand that results from the focus group will be de-identified prior to data analysis and no information which could identify study participants will be used in final study reports.

I understand that an audiotape will be made of the focus group session and will be transcribed by the research assistant. I understand that data collected from this study will be analysed and findings used for the purpose of future publication in medical journals and public presentations. The data collected may also be used toward a doctoral thesis (PhD).

I understand that participation in this study is voluntary and I have the choice to withdraw from participating at any time. I understand that the Phase Director has assured that neither my grades nor academic relationships with members of staff within the School of Medicine, University of Auckland, will be affected by participating or not participating in this study.

I understand that the compiled non-identifiable study data and the study consent forms will be stored securely for six years at the South Auckland Clinical School, Middlemore Hospital, from the time this study is completed. After this time, it will be appropriately destroyed.

I would like to receive a pre-publication copy of the results of this study. YES / NO

The results can be emailed and/or posted to me at:

Address (if applicable):___________________________________________.

I agree to participate in the above study.

Name:___________________________________________________________

Signature:________________________________________________________

Date:__________________________

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE on 16/08/13 FOR 3 YEARS, Reference number 9827