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OCCUPATIONAL STRESS AND COPING STRATEGIES OF REGISTRARS, WORKING WITHIN THE DEPARTMENT OF ANAESTHESIOLOGY, AFFILIATED TO THE UNIVERSITY OF THE WITWATERSRAND

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Medicine in the branch of Anaesthesiology

Johannesburg, 2015

Declaration

I, Cara Redelinghuys, declare that this research report is my own work. It is being submitted for the degree of Master of Medicine in the branch of Anaesthesiology in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

…… (Signature of candidate)

…… day of …….. (Month), 2015

Abstract

Anaesthesiology has been identified as a stressful speciality. Anaesthesiology registrars are more vulnerable to workplace stressors, and experience higher rates burnout and stress compared to their senior colleagues. There is a paucity of information regarding stress and coping strategies amongst South African anaesthesiologists. Suicides within the Department of Anaesthesiology at University of the Witwatersrand, potentially related to workplace stress, prompted the need to identify stress and common coping strategies.

The aim of this study was to describe the occupational stress and coping strategies of registrars working within the Department of Anaesthesiology at the University of Witwatersrand.

A descriptive, prospective, contextual study design was used. Two validated questionnaires, the Perceived Stress Score (PSS); a ten item Likert scale and Coping Orientation and Problem Experience (COPE) questionnaire; a 60 item Likert scale, were combined to describe the stress and coping of anaesthesiology registrars. The questionnaires were distributed at the departmental academic meetings from May 2014 to November 2014. The sample was realised by the response of 52 registrars (47%), which fell below the recommended number to adequately power the secondary objectives of this study.

The overall PSS score was (21.48), with slightly higher PSS scores observed amongst females (22.9) compared to males (19.79). The registrars made use of all the fifteen coping strategies described in the COPE questionnaire. Denial, substance abuse and behaviour disengagement were the least adopted strategies. Positive reinterpretation and growth, use of instrumental social support, active coping and planning were the most commonly utilised strategies.

Anaesthesiology registrars working in Wits are more stressed than select communities in South Africa. Unmanaged stress is a worldwide source of suffering and illness within anaesthesiology; this study adds to this statement reinforcing the increasing importance of this issue. The coping strategies adopted by anaesthesiology registrars are varied and need to be encouraged especially amongst other colleagues who are not coping.

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List of Abbreviations

CHBAH	Chris Hani Baragwaneth Academic Hospital
CMJAH	Charlotte Maxeke Johannesburg Academic Hospital
COPE	Coping Orientation and Problem Experience
FCA	Fellowship of the College of Anaesthesiologists
HJH	Helen Joseph Hospital
HPCSA	Health Professionals Council of South Africa
ICAS	Independent Counselling and Advisory Service
IQR	Interquartile range
MMed	Masters in Medicine
ANOVA	A one way analysis of variance
PSS	Perceived Stress Scale
RMMCH	Rahima Moosa Mother and Child Hospital
SA	South Africa
SD	Standard deviation
UK	United Kingdom
USA	United States of America
WDGMC	Wits Donald Gordon Medical Centre
Wits	University of the Witwatersrand

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Chapter One: Overview of study

1.1 Introduction

In this chapter an overview of the study is given and will include the background to the study, the problem statement, aim and objectives, research assumptions, ethical considerations, research assumptions. This chapter also includes inclusion and exclusion criteria, data collection and analysis, significance of the study and a summary.

1.2 Background

Stress is described as "a negatively perceived quality which, as a result of inadequate coping with sources of stress has negative mental and physical health consequences" (1). A certain level of stress amongst anaesthesiologists may be beneficial for optimal functioning however when the coping strategies are inadequate there are negative consequences (2).

There have been relatively few formal studies on stress experienced by anaesthesiologists yet it is perceived as a stressful speciality (3). The negative impact of workplace stress on the doctor's health and mental wellbeing results in job burnout and compromises patient care (4).

Suicide rates within the medical profession are greater than those of the general population and anaesthesiologists have higher suicide rates compared to physicians working in internal medicine (5, 6). Previous studies confirm that the highest incidence of stress and suicide is amongst anaesthesiology registrars (7). Further indicators of stress and maladaptive coping strategies involve illicit drug use and alcohol abuse (7-9), this is evidenced in Australian anaesthesiology registrars with an addiction prevalence of 1-2%. This is 3-7% higher than that of the general population. These findings are consistent with other studies. (8, 10)

Stress in the workplace and specifically within the operating room needs to be identified early and managed efficiently to minimise further morbidity, mortality and resource wastage (2). Impaired doctor's performance and patient care has cost implications for the public health sector (11). There are also the additional costs of training and recruitment of

additional anaesthesiologists to offset the wastage in terms of early retirement, substance abuse and suicide (12).

1.3 Problem statement

Anaesthesiology has been identified as a stressful speciality. Sources of stress include level of expertise, long working hours, after hour calls and exhaustion. Factors such as economic uncertainty, litigation concerns and personal relationships are contributory. (13) Stress in the workplace is mitigated by high levels of empowerment, high levels of job challenge, high satisfaction and high work commitment (14). Anaesthesiology registrars are more vulnerable to these stressors, experiencing higher rates of emotional exhaustion than their senior colleagues. This may be attributed to less self-confidence, feelings of under supervision and lack of empowerment which decrease an individual's ability to cope (15).

There is a paucity of information regarding stress and coping strategies amongst South African anaesthesiologists. Recent suicides within the Department of Anaesthesiology at University of the Witwatersrand, potentially related to workplace stress, prompted the need to identify stress and coping strategies amongst anaesthesiology registrars.

1.4 Aim and objectives

1.4.1 Aim

The aim of this study was to describe the occupational stress and coping strategies of registrars working within the Department of Anaesthesiology at the University of Witwatersrand.

1.4.2 Objectives

The primary objectives were to describe the:

- levels of stress quantified by anaesthesiology registrars using the Perceived Stress scale (PSS), and
- common coping strategies, employed by anaesthesiology registrars using the Coping Orientation and Problem Experience (COPE) questionnaire.

The secondary objectives were to compare PSS score and COPE themes by:

- gender
- years of registrar training
- academic achievements
- number of hospitals worked in
- marital status
- number of children.

1.5 Research assumptions

The following assumptions were used in this study.

Registrar: "a doctor who is in the process of acquiring a specialist qualification endorsed by the HPCSA, for specialist practice." (16)

Consultant: any anaesthesiologist who has completed the specialist qualification. Consultants are also referred to as senior colleagues or seniors.

Stress*:* the pattern of psychological, behavioural, and physiological response of an individual to demands of the physical and social environment that exceeds that person's ability to carry out activities, realise goals, and experience satisfaction (17).

Coping: " an adaptive or successful method of dealing with individual or environmental situations that involve psychological or physiological stress or threat" (18).

Perceived Stress Scale (PSS): a ten item Likert scale questionnaire designed to measure stress perceived in certain situations. The scale includes direct questions regarding experienced stress levels and indirect questions to identify the degree of overload, unpredictability, and lack of control. (19)

COPE questionnaire: a coping inventory assessing the different ways in which people respond to a perceived stress. The questionnaire has 60 Likert scale items identifying fifteen themes of coping which are divided into problem focused coping, emotion focused coping, and dysfunctional coping. (20, 21)

1.7 Ethical considerations

Permission to conduct the study was obtained from the Human Research and Ethics Committee (Medical), (Appendix 3). The questionnaires were voluntary and consent was implied on completion of the questionnaire. Care was taken to maintain anonymity and confidentiality of the anaesthesiology registrars involved.

This study was conducted in accordance with the Declaration of Helsinki (22) and the South African Good Clinical Practice Guidelines (23).

1.8 Research methodology

1.8.1 Research design

A descriptive, prospective, contextual, study design was used.

1.8.2 Study population

Anaesthesiology registrars (total of 110) working in the Department of Anaesthesiology affiliated to Wits.

1.9 Study Sample

Sample size

All anaesthesiology registrars working in the Department of Anaesthesiology were eligible to participate. The sample size was realised from the number of respondents. The overall response rate was 47% (52 registrars).

Sampling method

Convenience sampling was used, which includes participants who are available at a time of data collection (24).

1.10 Inclusion and Exclusion criteria

All anaesthesiology registrars working in the Department of Anaesthesiology, Wits were included in the study.

Exclusion criteria were registrars:

- who declined to participate in the study
- on annual, special or sick leave at the time of data collection
- who submitted incomplete questionnaires (greater than 50% of questions omitted)

1.11 Data collection and analysis

1.11.1 Data collection

The questionnaire (Appendix 1) together with an information letter (Appendix 2) was distributed to all anaesthesiology registrars at the departmental academic meetings which were held on a weekly basis from May 2014 to November 2014.

The questionnaire consisted of three parts, demographic information; the PSS questionnaire (19) and COPE questionnaire (20).

Data collected from the surveys were captured by the researcher onto Microsoft® Office Excel 2010 spread sheets for analysis.

1.11.2 Validity and reliability

Measures were taken to ensure the validity and reliability of the study was maintained.

1.11.3 Data analysis

The data was analysed on STATA version 13, a statistical program. Descriptive and inferential statistics were used to describe the data.

1.12 Significance of the study

This study was the first to describe the perceived stress and coping of anaesthesiology registrars, affiliated to Wits. Chronic stress is associated with significant physical and mental

health risks (25). Registrars in anaesthesiology are less protected from workplace stress and have a greater risk of burnout compared to their senior colleagues (15). These negative experiences and increased stress levels have a deleterious effect on registrar learning (25-28) and ultimately negatively impact patient care (11, 29).

The results of this study identify perceived stress amongst registrars, highlighting the ongoing need within the department for early intervention and counselling.

Since the commencement of this research report there has been the creation of a mentorship programme within the department and as well as the creation of a wellness committee. In November 2014 Wits anaesthesiology department enlisted the involvement of ICAS, an Independent Counselling and Advisory Service. ICAS is an international provider of behaviour risk management to the business, health and governmental sector in South Africa. The employee wellness programme provides psychological counselling services, and assistance with legal, financial and family concerns. (30).

1.13 Study outline

The chapters in this research report include:

- Chapter 1 consists of an overview of the study
- Chapter 2 consists of the literature review
- Chapter 3 consists of the research methodology
- Chapter 4 consists of the results and discussion
- Chapter 5 consists of a summary, limitations, further recommendations and the conclusion.

1.14 Summary

In this chapter an overview of the background, problem statement, aim, objectives, research assumptions, research methodology, data analysis, significance, and study outline was given. In the next chapter the literature review is discussed.

Chapter two: Literature review

2.1 Introduction

This chapter includes a review of literature on stress, expanding on two common models of stress. Stress in the medical profession, stress amongst anaesthesiologists and the negative consequences of stress are discussed. This chapter also focusses on coping, both positive and negative and reviews the PSS and COPE questionnaires.

2.2 Background

Within contemporary society the workplace plays a central role, and working conditions impact on a person's mental and physical well-being. In the modern work environment there has been a general decrease in physical demands and hazards encountered but an increase in psychosocial stress due to an increase in work pace, the frequent introduction of new technologies, increased competition, and a higher emphasis on efficiency. (31)

McCue (32) commented "it is unlikely that optimal medical care can be delivered by unhappy or maladapted physicians". Doctors who enjoy their work and are emotionally stable within their personal and work environment, are able to be empathetic to a patient's distress and place the patient's interest first. (32)

There is a global shortage of anaesthesiologists and specialist training involves years of undergraduate and postgraduate study at significant cost to the public health sector. Occupational stress amongst doctors results in early retirement (2, 3), poor mental and physical health (11, 29, 33, 34), and compromises patient care (11). Anaesthesiologists are a precious and scarce commodity that needs to be retained in a resource constrained environment such as South Africa (35). Bateman (36) is of the opinion, "Physicians should not have to choose between saving themselves and serving their patients."

In a recent letter to the editor of the South African Journal of Anaesthesia and Analgesia in 2013, authors Brannigan and Beeton (37) highlighted concerns for colleague anaesthesiologists health and wellness and suggested a national initiative to combat the

high levels of stress and burnout “literally killing our colleagues at a rate unrivalled by any other disease.”

This statement was based in part on the findings of Van Der Walt’s (38) study addressing burnout amongst anaesthesiologists. Within anaesthesiologist and registrars working in hospitals affiliated to Wits, there was 21% incidence of burnout. This is characterised by “increased levels of depersonalisation and emotional exhaustion as well as decreased levels of personal accomplishment”. There was no difference in the incidence of burnout between males and females, registrars and anaesthesiologists, and those working in public or private hospitals. (38)

2.3 Models of stress

Stress has multiple definitions and several models have been developed to explain its causal nature. Frankenhaeuser (39) described stress as an “imbalance between perceived demands of an environment and an individual’s perceived resources to meet those demands”. This discrepancy can be due to excessive responsibility, interpersonal conflicts, and unreasonable workloads (39).

The Demand-Control Model and Effort-Reward Imbalance Model are commonly used when describing job related stress, and supplement each other**.** The Demand-Control Model deals with the nature of the work and the Effort Reward Imbalance Model deals with the context in which the work is conducted (40). In contrast to the Demand-Control Model (41), the Effort- Reward Imbalance Model incorporates personal components and the emphasis is on rewards rather than control (42-44). Using epidemiological studies, both models have successfully predicted disease occurrence, particularly coronary heart disease (33, 34, 45-49). In combination, the Effort- Reward Imbalance and Demand-Control model are more predictive for disease outcomes than either model alone. (44)

2.3.1 Demand-Control Model

Karasek (14) originally proposed the model in 1979 which included not merely the type of job demands but also included the work conditions. The model was based on a study performed in the mid-70s in Sweden. Karasek and Theorell (41) collaborated in applying the

Demand-Control model as a predictor of cardiovascular disease in 1990. They suggested that work demand and decision latitude or control, together have an impact on psychological and physiological health. The combination of high demands and low job control contributes to high work strain and increased negative outcomes. The scenario of high demand and high control within a job has not been associated with increased negative consequences. (31)

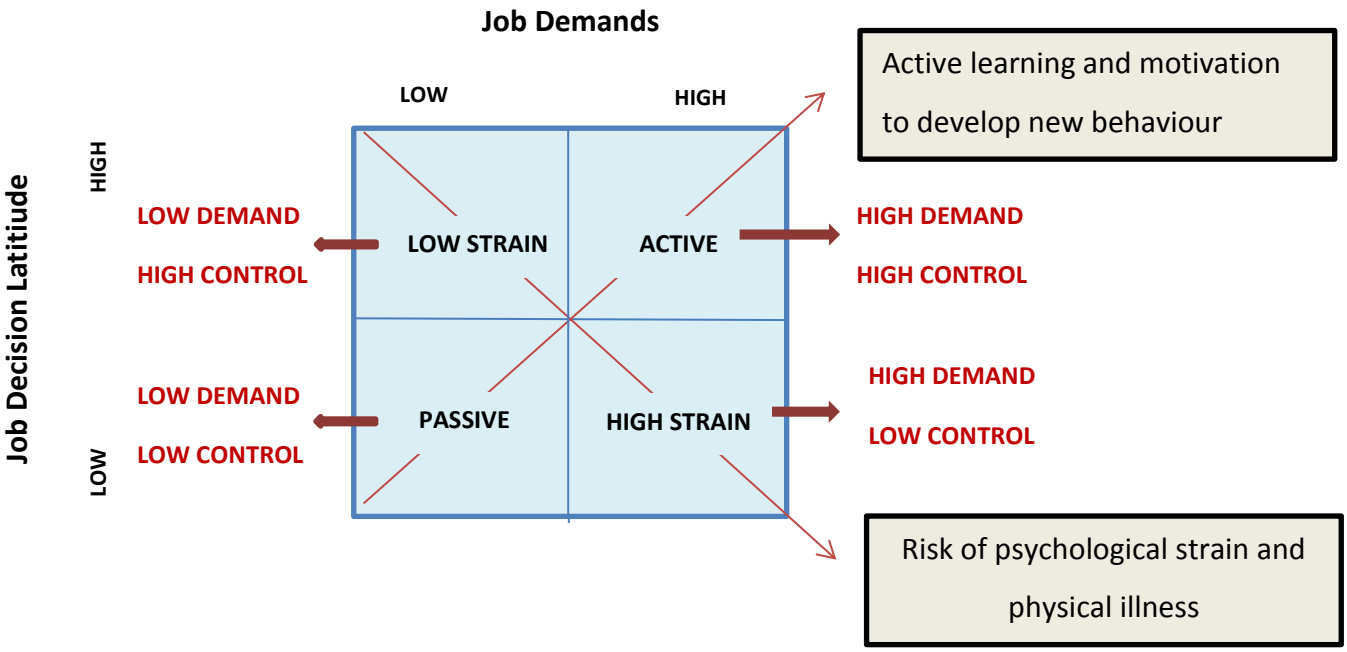


Figure 2.1 Demand-Control Model (50)

Four distinct job types are illustrated in Figure 2.1. These jobs are identified with combinations of high and low levels of control and work demands, as well as the psychological and physical effects of each job type. The job types are; high demand with low control (high strain), high demand and high control (active), low demand and high control (low strain) and low demand and low control (passive). (41)

Active jobs are both rewarding and challenging and individuals who have the resources to meet these demands resolve work stresses with little residual job strain. This results in a minimal impact on an individual's health. The opposite is true for passive jobs with little or no control. Individuals experience decrease in motivation, loss of learned skills, average

levels of job strain and average effects on physical health. Individuals in passive jobs with high levels of control have a less than average experience of strain and below average risk of physical and psychological disturbance. The greatest risk of suffering both mental and physical illness are individuals exposed to high strain jobs where demands are high and control over execution of work is low. (51)

Social support was added to this theoretical model in 1988 by Johnson and Hall (52) although not represented in Figure 2.1 and has been found to be protective against stress in the work place. Social support includes "close social ties and someone with whom to share emotional experiences". Low social support has been associated with higher morbidity and mortality. (31, 49)

2.3.2 Effort-Reward Imbalance Model

Siegrist's (53) Effort-Reward Imbalance Model is an alternative and complimentary psychosocial work model including three scales; extrinsic efforts, rewards, and over commitment. It was first described by Siergist in 1996 based on research conducted in 1990 over a period of 5 years in America and China amongst "blue collar" workers and middle managers.(53) Effort at work is part of a societal agreement that returns effort with sufficient reward. These rewards can be in the form of financial incentives, support from supervisors and colleagues, better career choices, higher social rank, and job security. Extrinsic efforts include both physical and psychological demand of work. Inadequate rewards for an individual's efforts result in increased stress levels, which results in increased illness. (42, 43)

Siegrist (53) incorporates into the model the personality characteristic of overachievement which puts the individual with this trait at particular risk of health and stress related problems. These individuals have inappropriate perceptions of demands and resources. Their pattern of coping is characterised by excessive work commitment, maintaining the imbalance and placing them at increased health risk.

Figure 2.2 graphically represents the imbalance between effort and reward. This imbalance is maintained by three factors. These factors are; no alternative choice available, accepted for strategic reasons (to improve career prospects in the future), and if an individual possesses a motivational pattern of coping characterised by over commitment. High effort

and low reward combined with an overcommitted motivational pattern places the individual at particularly increased risk of reduced health. (42, 43, 53, 54)

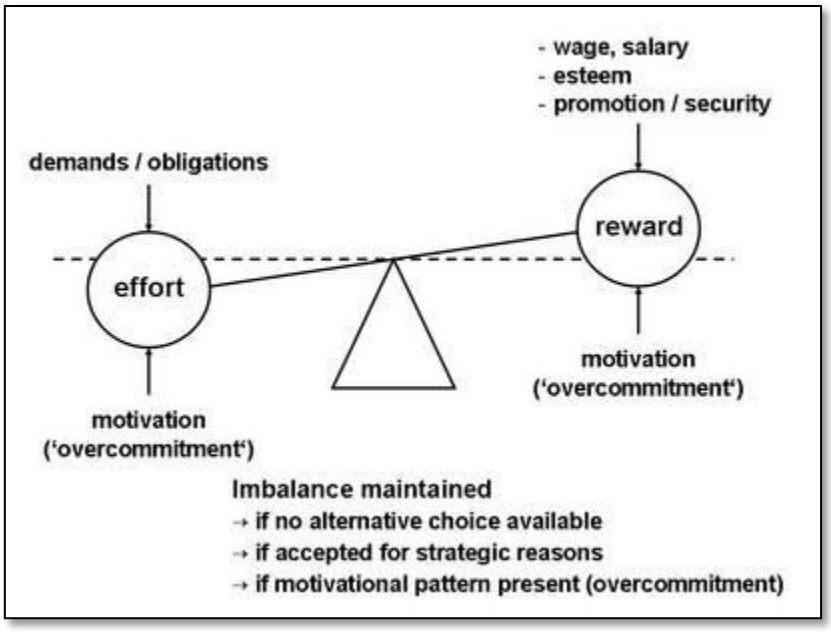


Figure 2.2 Effort-Reward Imbalance Model (54)

2.4. Perceived stress scale: a measure of stress

The Perceived Stress scale is one of the more popular tools for measuring psychological stress. The original scale consisted of fourteen items but was shortened to ten items after research conducted amongst 2387 American workers (55).The scale measures the degree to which one experiences are judged as being stressful. It consists of ten items with 5 positive and 5 negative items rated on a 5 point Likert scale. The score is obtained from reversing the score e.g. 0=4; 1=3; 2=2 etc. of the positive items (items 4, 5, 7 and 8) and summing across all items with the maximum score is 40 indicating the highest level of stress. (19) The norm mean scores for males in America is 12.1 (SD 5.9) and females 13.7 (SD 6.6). The ten item PSS employed an internal consistency of 0.78 (Cronbach's alpha coefficient). It has been established as an inexpensive, reliable, and valid tool. The authors argue that it is able to not only measure psychological symptoms but is also predictive of health outcomes. (55)

The PSS has been previously used within the South African context, amongst 257 low income South African adults in 2004. Hamad et al (56) reported mean stress scores of 19.6 in females and scores of 17.5 in men, with an overall score of 18.6 (SD 6.6).

2.5 Stress experienced by the medical profession

Stress within the medical profession is well recognised (57). Wrong decisions can lead to litigation or worse, harm to the patient (29, 32). Aspects within the medical profession contribute to emotional stress such as death, trauma, suffering, and communication difficulties. There may be ethical and moral conflicts regarding patient treatment. Environmental risks such as exposure to human immunodeficiency virus (HIV) and hepatitis, physical assault from combative or confused patients also exist increasing a doctor's personal risk. (2, 31)

Although clinical aspects of a doctor's job can be intrinsically difficult, other extrinsic factors contribute to workplace stress. Factors such as day-to-day management problems and increased bureaucratisation of health care are perceived as being a source of stress. Training prepares doctors for their clinical responsibilities but leaves some unequipped for these organisational factors. (2, 31) Assessing the impact and magnitude of stress amongst doctors is potentially difficult. Lack of coping is often under reported to fellow health professionals for fear of prejudice and losing the respect of colleagues. (1)

In South Africa, Thomas (12) showed higher levels of workplace stress amongst doctors working in the public sector compared to the general population. The study included 70 full time doctors of varying grades of expertise from interns to heads of departments from November 2000 to April 2001 in a peripheral public sector hospital in Gauteng. The doctors had 4.1% below average scores for job satisfaction and 3.8% greater perceived mental ill health.

Sources of work stress identified by South African doctors in Thomas' (12) study included:

- understaffing
- inadequate resources
- lack of control and involvement in decision making

- managing infectious patients with the risk of self-exposure (HIV and TB)
- poor work security
- poor career advancement
- excessive work schedules
- poor salary structure and benefits

Shortages of resources, exposure to HIV and long working hours were the top contributors to stress in a study conducted in August 2005 amongst interns working in hospitals affiliated to Wits. Of the 27 participants, 40% found their job “significantly” or “overwhelmingly” stressful. (58)

Long-term exposure to chronic stress results in a syndrome termed “job burnout”. Burnout is a triad of emotional exhaustion, depersonalisation, and lacking a sense of personal achievement. People experiencing this have early signs of stress arousal (irritability, anger and sleep disturbance) and exhaustion, both physical and mental. (1, 4). Burnout has been linked with impaired workplace functioning placing the quality of patient care at risk and may be contributory to drug addiction (8) and suicide (5, 6).

2.6 Stress experienced by anaesthesiologists

Anaesthesiology has been recognized as a stressful profession, and over the past decade an anaesthesiologist’s scope of practice has broadened to include emergency care, intensive care, and pain management. Some anaesthesiologists are also becoming increasingly involved in research, teaching, and administrative obligations. (3, 59) Contributors to chronic stress amongst anaesthesiologists include: incompetence, work pressure, long working hours, after hour calls, fatigue, interpersonal relationships, and financial insecurity. The need for sustained attentiveness, fear of legal action, and unskilled leadership were additional factors. (1, 60, 61)

Kawasaki et al (62) conducted a questionnaire survey in 2005 including 1010 Japanese anaesthesiologists. Their work stress scores were 14.3 % greater than that of Japan’s general population. The incidence of occupation related health problems in 25 % of anaesthesiologists was 30 % greater the general Japanese population. Levels of work stress

were lower in anaesthesiologists with more than 10 years' experience and highest in those with less than 10 years' experience. The authors proposed that this may be due to improved coping skills learnt with experience as both groups had similar workloads.

Multiple studies have been conducted focussing on the various sources of stress amongst anaesthesiologists. Table 2.1 summarises a few of the more recent studies for comparison.

Table 2.1 Perceived sources of stress amongst anaesthesiologists

Author and year	Instruments and methods	Participants	Sources of stress
Nyssen (15) 2002 Belgium	Questionnaire survey	Anaesthesiologists (n=32) Registrars (n=119)	Lack of control over: • Time management • Non clinical tasks • Work organisation
Morais et al (63) 2005 Portugal	Questionnaire survey	Anaesthesiologists (n=263)	• Strained personal relations (38%) • Unskilled leadership (38%) • Surgeon conflict (25%) • Lack of resources (21%) • Technical difficulties (13%)
Chia et al (64) 2005 Australia Hong Kong	Questionnaire survey	Registrars (n=172) Hong Kong (n=64) Australia (n= 108)	• Treating ill patients • Challenging clinical situations • Medico legal considerations
Larsson et al (65) 2006 Sweden	Phenomenological Study (focus group)	Registrars (n=19)	• High work demands • Difficult role • Feeling of inadequacy • absence of support • Feelings of isolation
Larsson et al (66) 2006 Sweden	Qualitative interview study	Anaesthesiologists (n=19)	• Difficult job • Difficult ethical questions • High workload • Disrespect from surgeons
Shidaye et al (67) 2010 Sweden	Questionnaire survey	Anaesthesiologists (n=46) Registrars (n=146)	• Time limitation (34%) • Medico legal worries (24%) • Home-work imbalance (22%) • Clinical issues (20%) • Communication problems (9%)

In Portugal 90.9% of anaesthesiologist's suffered from job burnout, 44.8% lacked a sense of personal achievement and 57.9% experienced emotional exhaustion (63). In Van der Walt's study in 2013 amongst doctors within the department of anaesthesiology at Wits, the highest burnout scores were noticed in females with less anaesthesiology training, still working as a registrar and in the process of exam preparation. (38) Anaesthesiologists with greater than twenty years of experience had reduced emotional tiredness compared to colleagues with less experience, even though they were exposed to stress for a greater period. This can possibly be due to the development of coping tools over the years. (63) This is consistent with similar findings in Japan (62) and Belgium (15) and the studies summarise in table 2.1.

A personality characteristic of over commitment places the individual at particular risk of occupational stress according to the Effort-Reward Imbalance Model (46). Obsessive and perfectionist traits are common amongst doctors (2). The personality profile of Australian anaesthesiologists was described by Kluger et al in 1999 (68). There were common personality traits amongst the anaesthesiologists such as being diligent, inquisitive and perceptive but they found significant personality heterogeneity, with no one personality profile being dominant. There is no definitive evidence confirming the typical anaesthesiologist's personality has a negative effect on an individual's perception and reaction to stress. (69)

In South Africa, Thomas identified above average stress level in all doctors working in the public sector across all specialities (12). Anaesthesiologists had lower levels of job satisfaction, 7.5 % below the expected norm. Sources of stress identified within anaesthesiology included playing a managerial role (46.3%), organisational structures(49.33%) and poor career opportunities (33%). (12)

2.7 Stress experienced by anaesthesiology registrars

Internationally only two studies have been conducted focusing specifically on stress in anaesthesiology registrars. Larsson (65) looked at the experiences of anaesthesiology registrars in Sweden. With phenomenological analysis he found that "a feeling of deep insufficiency and loneliness" was the essence of difficulties experienced by registrars. The

registrars felt they were placed in acute situations that they feel ill equipped to handle. Major themes recognised in the interviews were; high demands, feeling of inadequacy, lack of assistance, feeling of helplessness and the job of anaesthesiology is " a difficult role to play" owing to the complexity of patients, new and different work environments coupled with a heavy burden of work. (66)

A comparison between 133 anaesthesiology registrars in Hong Kong and Australia was conducted in 2005 to identify common sources of stress and presence of burnout. Significant stressors in both groups were treating critically ill patients, challenging clinical circumstances and medico legal considerations. The registrars in Hong Kong also identified lack of resources and emphasis on service provision as significant stressors. Burnout was identified in 65.1% of registrars in Hong Kong and 38.2% in Australia. With correlation analysis, the authors were able to show emotional exhaustion as a strong predictor of job dissatisfaction ($p<0.001$).There was no positive correlation between personal achievement and job satisfaction. The author postulated the reason for greater levels of stress amongst registrars in Hong Kong is multifactorial. The work conditions were considered to be more adverse due to limited resources and less supervision. Registrars in Australia were older; 56% where 30-34 years of age compared to 65.6 % in Hong Kong were 25-29 years old. More Australian registrars had families with children and home ownership, most likely representing a stable social support system. (64)

Certain stressors are unavoidable components of anaesthesiology and senior anaesthesiologists report being generally content in their jobs (59). Anaesthesiology registrars are more exposed to occupational stress and have an increased risk of burnout compared to their senior colleges (15). These negative experiences and increased stress have a deleterious effect on registrar learning. (25-28) This highlights the need for adequate supervision to improve professional competence and to learn from more experienced anaesthesiologists how to handle the various stressors inherent to anaesthesia. This will allow for meaningful learning. (66)

Stress and the sources of stress amongst anaesthesiology registrars have to date not yet been described in the South African context. Van der Walt's study explored burnout scores amongst anaesthesiologists, including registrars, working within the Wits department of

anaesthesiology. He reported a 21% incidence of burnout within the department this was in comparison to 8 % amongst anaesthesiologists working within the private sector.(38)

In 2006 the Australian Medical Association (AMA) produced a set of guidelines for doctor in training to improve the support of registrars. (70) Registrars should be encouraged to care for their physical and psychological wellbeing by making use of regular leave, eating a healthy diet, exercising and relaxing on a regular basis. An attitude of willingness to admit illness, or diminished ability to perform usual occupational functions needs to be fostered. This goes together with a culture of "no blame" to assist those in distress. (70)

2.8 Negative consequences of stress

Chronic stress is associated with significant physical and mental health risks (25). It correlates with increased risk of coronary heart disease, typically in jobs with high demand and low control (33, 71, 72). Greater ambulatory blood pressure, structural changes in the heart (34) and raised levels of glucose and cholesterol have been associated with increased job strain, increasing the risk of coronary heart disease. (45, 47) Maladaptive coping strategies, such as cigarette smoking, lack of exercise, poor diet and heightened emotional state, may be contributory in the increasing cardiovascular risk (73).

Chronic stress also results in varying levels of intellectual impairment with poor concentration and impaired judgement (57). It is linked to reduced memory and learning and altered cognitive functioning, with a move from goal directed thinking to habitual responses (25). Although generally adaptive, these alterations in thinking under stress promote dysfunctional behaviours and the development of psychological disorders such substance abuse and addiction (74). Approximately 8-12 % of all practising doctors are expected to develop a substance abuse disorder in their career (75).

Depression and fatigue are consequences of chronic stress, impacting not only the anaesthesiologist job satisfaction but also patient care. In America 178 physicians and patients were matched by Halbesleben et al. Emotionally exhausted doctors had reduced patient satisfaction and patients had prolonged recovery to normal function, despite the severity of the disease (29). A prospective cohort study of paediatric doctors in the United

States described 20% of participants at high risk of depression, this is double that of the general population. The study found a six fold increase in medication errors in doctors experiencing depression compared to their non- depressed peers (11). Gordon (76) conducted a survey in Cape Town, on anaesthesiologists admitting to drug errors. Administration of the incorrect drug occurred in 93.5% of anaesthesiologists, over the course of their career. Fatigue from work overload and sleep deprivation were identified as a causal factor in 23.5% of drug errors.

2.9 Positive consequences of stress

The Chinese symbol for crisis incorporates two characters, one means danger and the other means opportunity. This can be true for any stress a person experiences. The process of appraisal and problem solving, if successful, will result in psychological growth. (77) Within anaesthesiology stress is inevitable and moderate levels of stress may be beneficial in providing the impetus for optimal functioning (1, 2).

There are broadly three dimensions of benefit described by Joseph and Linley (78). Firstly the enhancement of certain relationships, an example is appreciation of social supports. Secondly there is a change in the way that people view themselves, such as a greater sense of strength, wisdom or resilience. There is an acceptance of an individual's limitations and vulnerabilities allowing for the creation of positive coping mechanisms. Thirdly, there is a change in life philosophy and that may result in a change in spiritual beliefs.

2.10 Coping

Coping strategies have been defined as strategies implemented to diminish harm and promote a person's wellbeing (18). Strategies can be divided into problem focussed, which involves active steps to alter the stress or emotion focussed, aiming at managing the emotional distress associated with stress. (79, 80) Coping is a "shifting process", in different situations different strategies are relied on. Lazarus and colleagues (79) apportion great importance to the appraisal of a situation as this determines the coping strategy employed. If a situation is appraised as being harmful, but holds potential for benefit then emotion

focused coping is used. However if the situation is appraised as being solved by action then problem-focused coping will be used.

Lemaire and Wallace (81) conducted a multicentre mixed methods study in a health region of western Canada, of coping strategies in physicians across all specialities. The study was carried out between September 2006 and July 2007. Five themes of coping were identified; the most prevalent strategy was to "work through" the stress and the second most prevalent was talking to a colleague. Other strategies in order of popularity were "taking time out", using humour or ignoring the presence of stress. Strategies out of the workplace include exercise, quiet time, family time, talking to a spouse and "leaving work at work".

In 2007, Larsson (66) explored senior Swedish anaesthesiologists' perceptions of work and how to cope with difficult situations. Anaesthesiology is an inherently difficult speciality yet these anaesthesiologists maintained significant job satisfaction. The senior anaesthesiologists adopted two different strategies, firstly problem-solving acts and secondly appraisal of perceived threats as challenges. When faced with a medically difficult case, problem-solving included simplification of tasks, asking for advice especially amongst trusted colleagues and support in the workplace in the form of debriefing amongst fellow anaesthesiologists. The appraisal included acceptance of medically challenging situations as part of the job, acceptance of own competence and potential to fail. Acceptance of the fact that "we are not God" and "there is a limit to what even the best care can do for a critically ill patient". (66)

Ethically difficult situations were acknowledged as part of the job and discussion with colleagues was beneficial. The stress of an increased workload and loss of control were handled by prioritising and doing one task at a time. Delegation and asking for help were other problem solving strategies. (66) Junior anaesthesiologists can benefit from learning how to transform stressful situations, inherent to anaesthesia, into challenges.

In 2008 , Sun et al. (58) described the coping skills of 68 South African interns, working with hospitals affiliated to Wits. Of the interns coping, 91 % considered taking vacations and family support as the top stress relievers. Alcohol was a coping mechanism amongst 20 interns, cigarettes in 11 interns and 3 reported drug abuse as a coping mechanism.

2.11 Maladaptive coping

When an individual is faced with a problem which represents a threat to that person, the response is increased tension and anxiety. That individual looks to previous problem solving methods that have been successful in the past. If implemented and successful then the threat is terminated, however if unsuccessful then tension is further increased. (77)

2.11.1 Substance abuse

The terms drug addiction and drug abuse are often used to describe excess drug use but they are not synonymous. Drug abuse is defined as “habitual use of drugs not needed for therapeutic purposes, solely to alter one's mood, affect, or state of consciousness, or to affect a body function unnecessarily.” (18). Drug addiction is “Habitual psychological or physiologic dependence on a substance or practice that is beyond voluntary control” (18). It is characterised by compulsion, lack of control, and continued use despite negative consequences (7).

Alexander (5) gathered data from 1970-1995 on the causes of death of over 40 000 anaesthesiologists in America. He suggested in his study of cause related mortality risk, that drug related death is greatest in the first five years post-graduation and remained 2.8 fold increased in comparison to physicians through the career of the anaesthesiologists. A survey of known drug abuse amongst anaesthesiologists in America, found a 1 % incidence in the faculty and 1.6 % incidence in registrars. (82)

Anaesthesiologists can suffer from addiction to a number of substances, yet opioid dependence is most common (8, 10, 83, 84). Fentanyl and sufentanil are the most commonly abused opioids, followed by pethidine and morphine (85). Other agents are also abused such as propofol, ketamine, sodium thiopentone, lignocaine, volatile anaesthetics and nitrous oxide. (83)

In 1980, Gravenstein (84) found an incidence 1-2% of substance abuse amongst anaesthesiology personnel, including doctors, nurses and medical students across 15 American academic anaesthesiology departments. Data were collected from self-reporting questionnaire. Opioids were the most frequently abused substance amongst 17% of the personnel. Other substances abused included alcohol (9%), nitrous oxide (7%), barbiturates (6%), tranquilisers (3%), anaesthetic vapours (2%), cocaine and amphetamines (1%) (84).

Lutsky (8) conducted a retrospective survey of 260 American anaesthesiologists training from 1958 to 1988. The cumulative incidence of drug abuse and associated impairment of professional function was 5.5%. The motivation for using these drugs was "to get high" in 32%. Daily use for more than two weeks occurred in 38% and 28% of participants admitted to addiction. The author was unable to prove increased substance abuse during registrar training. (8)

Twenty years later Booth et al (82) published the data from a survey of reported drug abuse issues in 133 academic anaesthesiology departments from 1990-1997. The incidence has remained unchanged in comparison to Gravenstein's (84) findings. The incidence of abuse amongst anaesthesiologists was 1 % and 1.6 % amongst the registrars. The choice of agents was also similar, fentanyl still being the most commonly abused opioid.

The treatment outcomes and re-entry of impaired anaesthesiology registrars back into anaesthesiology has been investigated in both America and Australia. Collins et al (86) surveyed American anaesthesiology registrars with known chemical dependence and detailed their outcomes and experiences over a ten year period (1991-2001). Only 46% of the registrars were able to successfully complete the anaesthesiology training programme, and 40 % did return to medical practice but within another speciality. Amongst these registrars re-entering medical practice, 14% died from relapse-related causes.

This is consistent with a smaller study conducted in 2004 by Fry (9) in Australia, addressing substance abuse and outcomes of treatment programmes, based on retrospective data from the preceding ten years. In the study substance abuse was investigated in all expertise levels within multiple anaesthesiology departments, the largest proportion of doctors with substance abuse problems were registrars (39%). Fourteen of the total sixteen registrars with known substance abuse had abused opioids, one abused propofol and the others, alcohol. The outcomes of these registrars were; 43% returned to anaesthesiology training and 25 % entered another medical speciality. A total of 2 registrars committed suicide (12%) and one was lost to follow-up. Even though the study population in Fry's (9) study was small the results are consistent with Collins et al (86) study.

Multiple factors have been suggested for this high rate of drug abuse within the anaesthesiology community. The close proximity to addictive drugs, the relative simplicity

with which small quantities can be taken and the high stress environment (83). There is scanty evidence that ongoing exposure in the work place to exhaled fentanyl sensitises "reward pathways" in the brain promoting substance abuse and increasing relapse. (87)

2.11.2 Alcohol

South Africa has a significant burden of disease related to alcohol consumption. South African males are consuming 39.64 litres of pure alcohol per person per year and South African females consume 23.84 litres. (88) The alcohol habits of anaesthesiologists in South Africa has not to date been addressed.

In Finland Juntunen et al (89) conducted a survey of doctors drinking habits in 1986. Alcohol consumption was found to be higher than that of the general population. Male doctors were consuming 6.2 litres of pure alcohol per person per year (4.5 litres in the general population) and female doctors 2.8 litres (1.3 litres in the general population). Increased consumption was significantly associated with job burnout and stress (89). In a recent study conducted amongst American surgeons in 2010, 15.4 % of the surgeons met the criteria for alcohol abuse or dependence. This is consistent with the prevalence of 10-15% amongst all American doctors.(90) The study was also able to support Juntunen's (89) study with a strong association between burnout and alcohol abuse.

2.11.3 Suicide

Suicide is a significant cause of death worldwide. In South Africa the overall age-standardised rates was 25.3 per 100000 for men and 5.6 per 100000 for women between 2001 and 2003. Data from suicides in Johannesburg, eThekwini, Cape Town, Tshwane, Nelson Mandela and Buffalo City were gathered from medico-legal post mortems. No data was available regarding drug related deaths however 40 % of the suicides were positive for alcohol on blood assay. (91, 92) The mortality related to suicides amongst anaesthesiologists in South Africa has not been published to date.

Alexander et al (5) conducted a cohort mortality study of American physicians and anaesthesiologist. Data from the American Medical Association was collated; a figure of approximately 250 suicides per 100 000 is estimated for anaesthesiologists. This is fifteen times greater than that of the general population in America (5, 93). When comparing the two specialities anaesthesiology has a relative rate ratio of 1.45 for suicide and this ratio

increase to 2.21 if the suicide is drug related (5). A Finnish survey of anaesthesiologist found that one in four experienced suicidal ideation. Personal factors placing anaesthesiologist at higher risk are ill health, low social support and family difficulties. Work related factors included conflicts with colleagues and seniors, on-call-related stress and organisational injustice. (94)

2.12 COPE questionnaire: a measure of coping

The COPE (Coping Orientation and Problem Experienced) questionnaire assesses a wide range of coping, including functional and dysfunctional strategies (20). In 1983 Carver (20) felt there were shortcomings to the widely acknowledged distinction between problem focussed and emotion focussed coping. He divided coping into subdivisions, these diverse divisions were tested on 978 American students. The final scale contains fifteen scales and is seen as a more "fine grain" measure of the differences in coping (95) . Carver (20) reported alpha coefficients ranging from 0.65-0.92, except for mental disengagement, which measured less than 0.60. The questionnaire has proven satisfactory psychometric properties and evidence of validity and reliability in different cultural groups (96, 97).

In 2000, Pienaar et al (98) made use of the COPE questionnaire to describe the coping of 1794 South African police officers. Pienaar et al subjected the COPE questionnaire to principal factor analysis. Only four internally consistent factors were found namely; active coping; avoidance; seeking emotional support and turning to religion. The questionnaire has also been used in South Africa by Van der Colff et al (97) amongst 818 nurses in 2008. The authors based its use on it proven reliability and validity in the South African context.

2.13 Conclusion

Anaesthesia is a stressful specialisation and registrars in anaesthesiology are particularly vulnerable to occupational stress (15). This stress is vital for the development of well-rounded anaesthesiologists with an armamentarium of coping skills developed over the years of training. Excess levels of stress impair learning and the anxiety created by this stress promotes maladaptive coping behaviour. The extent of stress and coping amongst South

African anaesthesiologists has yet to be described but in light of international trends and the increased levels of burnout (38), South African anaesthesiologists may be experiencing excessive stress in the workplace.

2.14 Summary

This chapter discussed the literature regarding the models of stress, the PSS questionnaire, stress experienced within the medical profession, stress within anaesthesiology and stress amongst anaesthesiology registrars. Further discussion focussed on the positive and negative consequences of stress. The chapter included discussion on coping, maladaptive coping, and the COPE questionnaire. In the next chapter the research methodology is discussed.

Chapter Three: Research methodology

3.1 Introduction

In this chapter the problem statement, aim and objectives, ethical considerations, research methodology and the validity and reliability of the study are discussed.

3.2 Problem statement

Anaesthesiology has been identified as a stressful speciality. Sources of stress include level of expertise, long working hours, after hour calls and exhaustion. Factors such as economic uncertainty, litigation concerns and personal relationships are contributory. (13) Stress in the workplace is mitigated by high levels of empowerment, high levels of job challenge, high satisfaction and high work commitment (14). Anaesthesiology registrars are more vulnerable to these stressors, experiencing higher rates of emotional exhaustion than their senior colleagues. This may be attributed to less self-confidence, feelings of under supervision and lack of empowerment which decrease an individual's ability to cope (15).

There is a paucity of information regarding stress and coping strategies amongst South African anaesthesiologists. Recent incidents within the Department of Anaesthesiology at University of the Witwatersrand, potentially related to workplace stress, prompted the need to identify stress and coping strategies amongst anaesthesiology registrars.

3.3. Aim and Objectives

3.3.1 Aim

The aim of this study was to describe the occupational stress and coping strategies of registrars working within the Department of Anaesthesiology at Wits.

3.3.2 Objectives

The primary objectives were to describe the:

- levels of stress quantified by anaesthesiology registrars using the PSS, and
- common coping strategies, employed by anaesthesiology registrars using the COPE questionnaire.

The secondary objectives were to compare PSS score and COPE themes by:

- gender
- years of registrar training
- academic achievements
- number of hospitals worked in
- marital status
- number of children.

3.4 Demarcation of study field

The study was conducted amongst anaesthesiology registrars within the Department of Anaesthesiology from May 2014 to November 2014. The following hospitals are affiliated to Wits, Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), Chris Hani Baragwaneth Academic Hospital (CHBAH), Helen Joseph Hospital (HJH), Rahima Moosa Mother and Child Hospital (RMMCH) and Wits Donald Gordon Medical Centre (WDGMC).

The Wits Anaesthesiology department consists currently of 74 consultants, 110 registrars, 27 medical officers and approximately twenty rotating interns.

3.5 Ethical considerations

Approval was obtained from the Human Research Ethics Committee (Medical) (Appendix 3) and the Postgraduate Committee (Appendix 4), affiliated to Wits.

The registrars were invited to complete a self-reporting questionnaire (Appendix 1). The questionnaire was accompanied with a participants' information letter (Appendix 2). Completion of the questionnaire was voluntary and the agreement to complete the questionnaire implied consent. Anonymity and confidentiality of participants' questionnaires was ensured. The questionnaire contains no identifying data and all questionnaires, were returned in an unlabelled sealed envelope provided with the questionnaire. Access to these questionnaires was restricted to the researcher and supervisors, and will be stored securely for a period of 6 years after completion of the study.

The contact details for support and counselling services were made available for registrars on the participants' information letter.

This study was conducted in accordance with the Declaration of Helsinki (22) and the South African Good Clinical Practice Guidelines (23).

3.6 Research methodology

3.6.1 Research design

A descriptive, prospective, contextual, study design was used.

A descriptive study aims to describe a situation or identify problems through observation, description or classification (24, 99). This study described, with the aid of a questionnaire, the levels of stress and coping strategies employed amongst anaesthesiology registrars.

A prospective study is defined as a study in which the variables are measured at the time the study takes place, as opposed to retrospective studies where variables that have already occurred are evaluated. In prospective studies the direction of inquiry is forward; therefore this is suitable for this study. (99)

A contextual study is one that takes place in a specific location (24). This study only describes the stress and coping in anaesthesiology registrars working in hospitals affiliated to Wits.

3.6.2 Study population

Anaesthesiology registrars working in the Department of Anaesthesiology affiliated to Wits.

3.6.3 Study Sample

Sample size

All anaesthesiology registrars working in the Department of Anaesthesiology were eligible to participate. The sample size was realised from the number of respondents. To analyse the secondary objectives with a one way analysis of variance (ANOVA) of 4 groups, an overall sample of 76 completed questionnaires was required. This would provide 90% power to detect a 0.05 level of difference in the means and effect size of 0.2.

Sampling method

Convenience sampling was used, which included participants who were available at a time of data collection (24).

Inclusion and Exclusion criteria

All anaesthesiology registrars working in the Department of Anaesthesiology, Wits were included in the study.

Exclusion criteria were registrars:

- who declined to participate in the study
- on annual, special or sick leave at the time of data collection
- who submitted incomplete questionnaires (greater than 50% of questions omitted)

3.6.4 Data collection

Two validated questionnaires, PSS and COPE questionnaires were chosen to meet the objectives of this study. Two experienced South African researchers reviewed it with regards to the South African context ensuring face validity. The PSS and COPE questionnaires were used with the author permission (Appendix 5)

The developed questionnaire (Appendix 1) consisting of three parts was created;

- **Demographics:** information requested will include gender, years of anaesthesiology training, marital status, academic milestones, place of work and number of children.
- **PSS:** 10 itemed Likert scale questionnaire describing stress levels (19).
- **COPE questionnaire:** a coping inventory assessing the different ways in which people respond to a perceived stress. The questionnaire has 60 Likert scale items identifying fifteen themes of coping which are divided into problem focused coping, emotion focused coping, and dysfunctional coping. (20, 21)

The questionnaires were distributed to anaesthesiology registrars at the departmental academic meeting which is held on a weekly basis. The researcher approached the chairperson of each meeting for permission to address the registrars.

All registrars were invited to take part in the study and those who agreed were issued an envelope containing the questionnaire (Appendix 1) and an information letter (Appendix 2). To ensure that all registrars receive the questionnaire it was distributed over a period 7 months, from May 2014 to November 2014. Every effort was made to include registrars involved in work related commitments such as emergencies and on call duties. It was estimated that fifteen minutes to complete but on the recommendation of the Human Research Ethics Committee (Medical), registrars were allowed to take the questionnaire home to reflect.

The registrars were requested to place both completed and uncompleted questionnaires in the envelope provided, unlabelled and then seal the envelope. These envelopes could be place in a box provided at the meeting or boxes placed in the departmental tea rooms, in each of the hospitals. A cut-off date was given of one week after the last meeting when the questionnaires are distributed. Access to this data is limited to the researcher and supervisors.

3.7 Data analysis

Data were captured on Microsoft® Office Excel 2007 spread sheets. The data was analysed on STATA version 13 (STATA Corporation, College Station, TX USA), a statistical programme, descriptive statistics and inferential statistics were used to describe the data.

With the use of a Likert scale there is uncertainty as to whether to use parametric or non-parametric tests (100, 101). Jamieson (100) commented " although Likert scales have rank order the intervals between values cannot be presumed equal." . Many of the studies using the PSS and COPE questionnaire express the results with mean and standard deviation (56, 98, 102-104). However Jamieson commented that "mean and standard deviation were inappropriate for ordinal data." Murray (101) recently conducted a study in 2013 to determine if the type of statistical analysis will affect the conclusions. The result was that irrespective of the statistical analysis the conclusions were the same. Non parametric tests have been used as the Likert scales are ordinal and the data is described with median and inter-quartile ranges. For ease of comparison with other studies the mean and standard deviation have also been included.

The data was compared to different categories based on gender, years of registrar training, academic achievements, number of hospitals worked in, marital status and number of children. Kruskal-Wallis and Willcoxon rank-sum tests were the inferential tests used to compare group results. P-values of <0.05 are considered statistically significant.

3.8 Validity and reliability

According to Botma et al (105) the validity refers to the, “the degree measurement reflects a true value” and reliability “ represents the consistency of the measure achieved.”

The validity and reliability of this study was ensured by

- Using an appropriate study design
- Using previously validated questionnaires
- Face validity ensured for South African context
- Time given to registrars to allow for reflection prior to returning the questionnaire
- Single data collector ensuing uniform instructions and collection
- Checking every tenth data entry point
- Data analysis with the assistance of biostatistician

3.9 Summary

In this chapter the problem statement, aim and objectives, demarcation of study field, ethical considerations as well as the validity and reliability are discussed. Further discussion involves the research methodologies including research design, study population, study sample, data collection and data analysis. In the next chapter the results are discussed.

Chapter four: Results and Discussion

4.1 Introduction

This chapter contains the results of the questionnaires and the discussion thereof. Results are presented as per the research objectives.

The primary objectives were to describe the:

- levels of stress quantified by anaesthesiology registrars using the PSS, and
- common coping strategies, employed by anaesthesiology registrars using the COPE questionnaire.

The secondary objectives were to compare PSS score and COPE themes by:

- gender
- years of registrar training
- academic achievements
- number of hospitals worked in
- marital status
- number of children.

4.2 Results

Tables and figures are used to report objectives where appropriate. For ease of reading, each primary objective is followed by a discussion of the related secondary objective.

4.2.1 Sample realisation

The questionnaires were distributed to anaesthesiology registrars at combined academic meetings from May 2014 to November 2014. A total of 110 questionnaires were distributed to registrars however only 58 questionnaires were returned over this period and 6 questionnaires were excluded due to the questionnaires being handed back incomplete. Therefore a total of 52 questionnaires were included in the statistical analysis (n=52). The overall response rate was 52 registrars of a total 110 (47%). This sample size is below the estimated sample size of 76 needed to adequately power the secondary objectives in this study.

4.2.2 Demographics

Demographic data collected during the study is illustrated in Table 4.1. Categorical variables are reported using frequencies.

Table 4.1 Demographics of anaesthesiology registrars (n = 52)

Variable		Number (%)
Gender	Male	24 (46)
	Female	28 (54)
Year of registrar training	Year 1	16 (31)
	Year 2	11 (21)
	Year 3	11 (21)
	Year 4	14 (27)
Number of hospitals worked in	1	9 (17)
	2	6 (12)
	3	6 (12)
	4	4 (8)
	5	15 (29)
	6	12 (23)
Academic achievements	None	19 (37)
	FCA part 1	20 (38)
	FCA part 2	9 (17)
	MMed research report	4 (8)
Marital status	Unmarried	13 (25)
	Married	39 (75)
Children	No children	39 (75)
	Children	13 (25)

4.2.3 Primary and secondary objectives: description and comparison of the levels of stress quantified by anaesthesiology registrars using the Perceived Stress Scale (PPS).

The sample consisted of 52 registrars originally divided into multiple groups based on years of registrar training, academic achievements, and number of hospitals worked in. As a result of the small sample size, the demographic variables needed to be regrouped to increase the number in each group, allowing for the fulfilment of the report objectives.

Respondents were divided according to years of study into 2 groups, namely, junior (year 1 and year 2) and senior (year 3 and year 4). For academic achievements three groups were created, namely no exams; FCA part 1 and MMed research report; and FCA part 2. The hospitals at which the registrars had worked was divided into two groups, those who have worked in three or less hospitals affiliated to Wits and those who have worked in more than three hospitals. The questionnaire required the registrars to confirm the number of children they have and their marital status. The majority (75%) of registrars were married while only 2 of the thirteen parents with children had more than one child. For ease of analysis the registrars were grouped into either having children or not having children.

The PSS is a scale with a maximum score of 40. The overall score for the PSS in this study is 21.48 (SD 7.86). Table 4.2 shows the breakdown of the scores using descriptive statistics and comparisons. For ease of comparison with the body of literature both median and means have been reported.

Table 4.2 Perceived stress scores

Variable		Number (%)	Median (IQR)	Mean (SD)	P value (Median)
Overall		52 (100)	21.50 (14-24)	21.48 (7.86)	
Gender	Male	24 (46)	20.50 (15-25.25)	19.79 (8.73)	0.17
	Female	28 (54)	24 (18.25-28.25)	22.93 (6.86)	
Experience	Junior (Year 1+2)	27 (52)	21 (17.50-27)	21.96 (7.05)	0.77
	Senior (Year 3+4)	25 (48)	23 (15-26)	20.96 (8.76)	
Exam achievements	No exams	19 (37)	21 (16-27)	21.36 (6.64)	0.34*
	Part 1 and MMed research report	22 (43)	23.10 (20-27.50)	23.45 (7.16)	
	Part 2	11 (20)	21.0 (8-26)	17.22 (9.92)	
Hospitals worked in	≤ 3	21 (40)	21 (16-27)	21.28 (6.49)	0.72
	> 3	31 (60)	23 (15-27)	21.50 (8.89)	
Marital status	unmarried	13 (25)	21 (16-24)	20.38 (6.09)	0.47
	married	39 (75)	22 (15.50-27.50)	21.84 (8.40)	
Children	No children	39 (75)	21 (16-26)	21.35 (7.55)	0.60
	children	13 (25)	25 (20-27)	21.84 (9.04)	

* Kruskal-Wallis tests used

4.2.4 Primary and secondary objective: description and comparison of common coping strategies employed by anaesthesiology registrars using the COPE questionnaire.

To assist the reader in understanding the three dimensions of the fifteen COPE strategies (20, 21) and for ease of comparison with other studies using the COPE questionnaire, Table 4.3 has been included. The table outlines the subdivision of the coping themes and a description of a typical response.

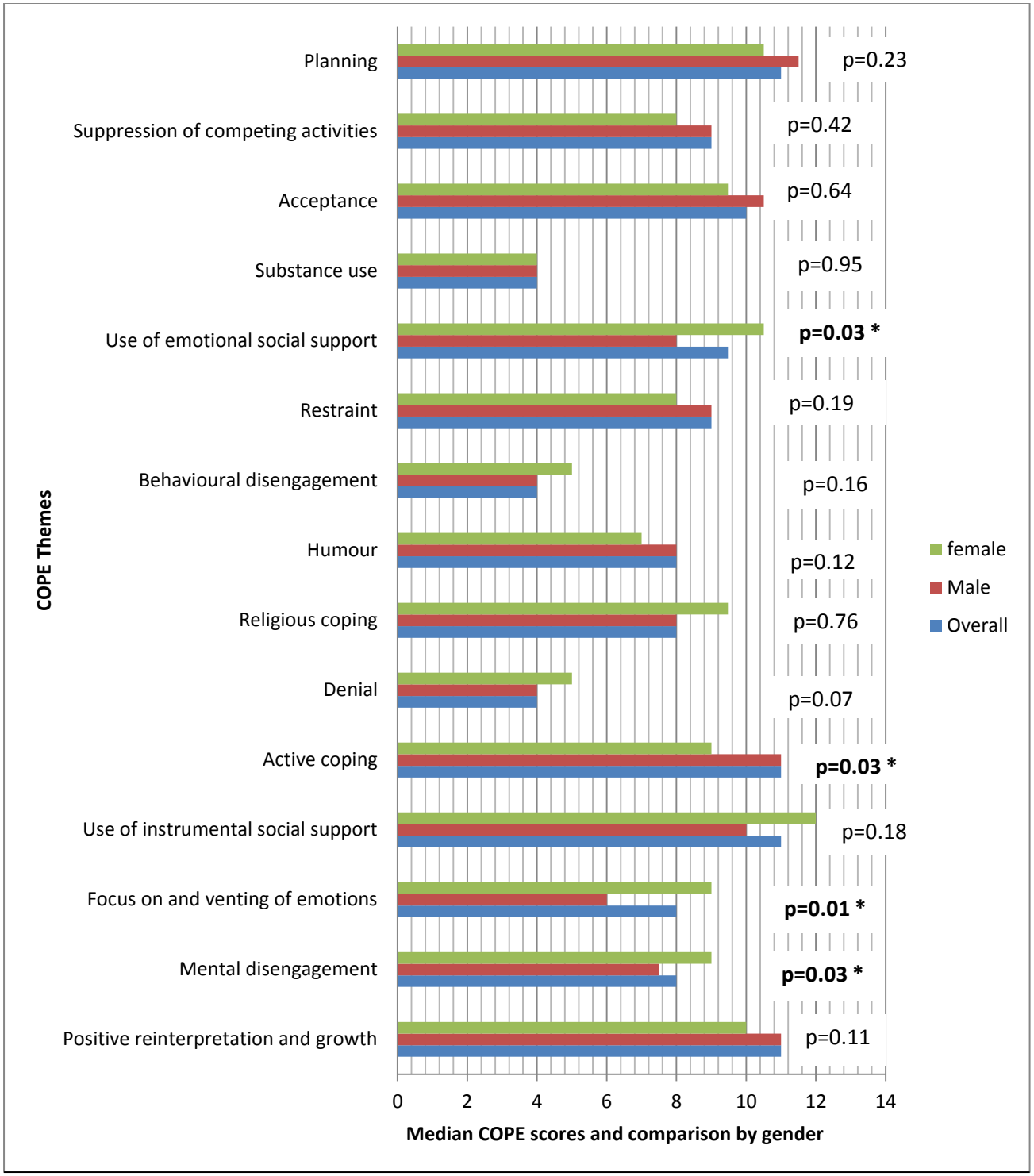
Table 4.3 The fifteen scales from the COPE questionnaire and typical responses (21, 106)

Major coping strategies	Coping theme	Typical coping response
Problem-focused	Active coping	Taking action to deal with the problem
	Planning	Thinking about the problem and how to deal with it
	Suppression of competing activities	Concentrate all efforts on that problem
	Restraint	Limit action till a suitable time
	Use of instrumental social support	Getting advice from other people
Emotion-focused	Positive reinterpretation and growth	Considering the problem as a positive experience
	Acceptance	To accept the problem
	Denial	Refusal to accept the problem
	Religious coping	Turning to religion for support
	Emotional social support	Looking for compassion and understanding from others
Dysfunctional	Focus on and venting of emotions	Communicating feelings
	Behavioural disengagement	Abandon dealing with the stress
	Mental disengagement	Diversion of thoughts away from the stress
	Humour	See the funny side of the problem
	Substance	Making use of alcohol and drugs to minimise stress

Wits anaesthesiology registrars make use all the fifteen coping strategies described in the COPE questionnaire; these are depicted in Figure 4.1. Denial (median 4), substance abuse (median 4) and behaviour disengagement (median 4) were the least adopted strategies. Positive reinterpretation and growth (median 11), use of instrumental social support (median 11), active coping (median 11) and planning (median 11) were the most commonly utilised strategies. This is a combination of emotion and problem focussed coping.

There was a significant difference between males and females in the adoption of four themes of coping. The females had higher scores for venting of emotions (median 9), mental disengagement (median 9) and use of emotional social support (median 10.5). Male

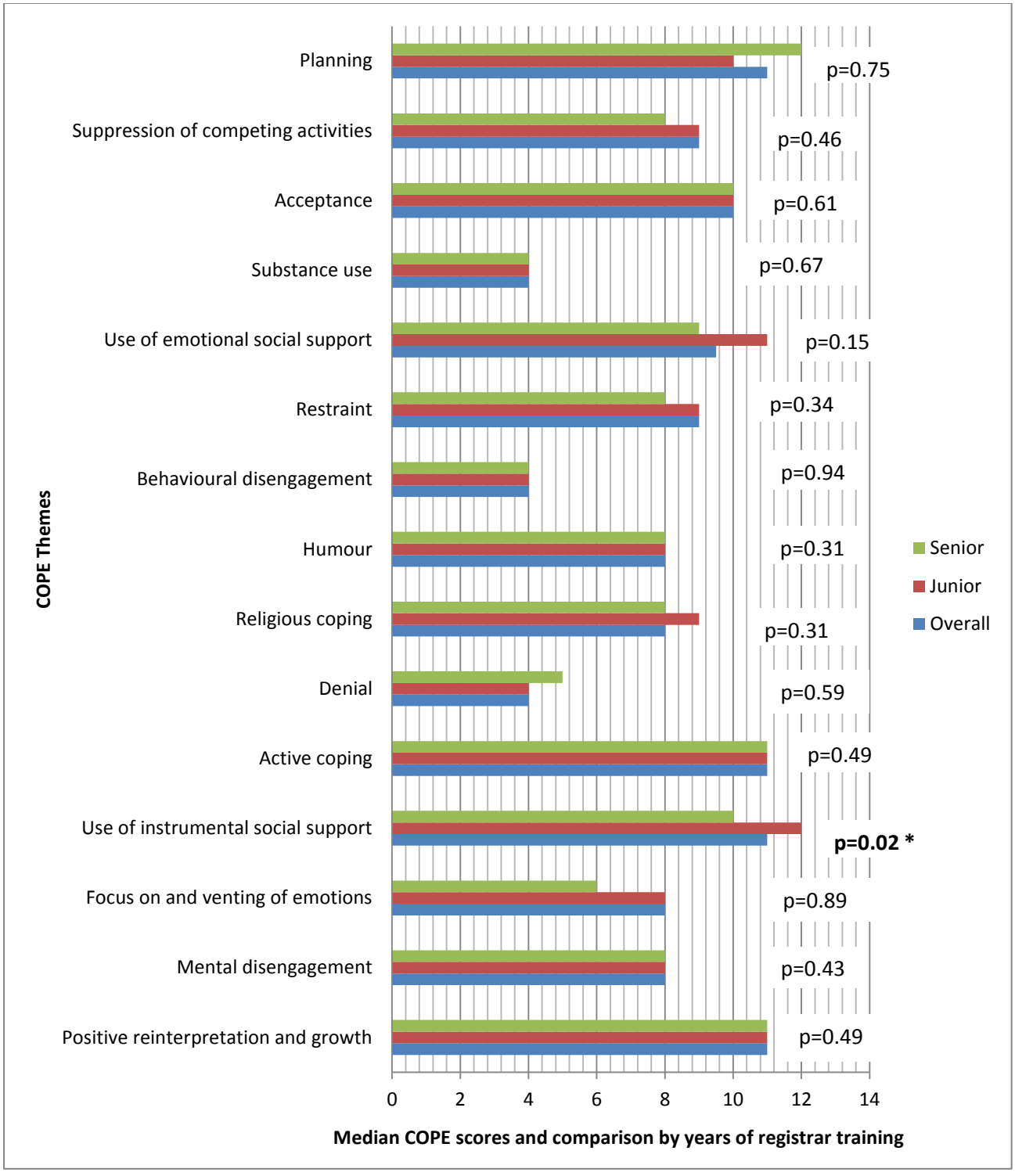
anaesthesiology registrars adopted active coping (median 9) more than their female colleagues.



*p value <0.05

Figure 4.1 Median COPE scores and comparison by gender

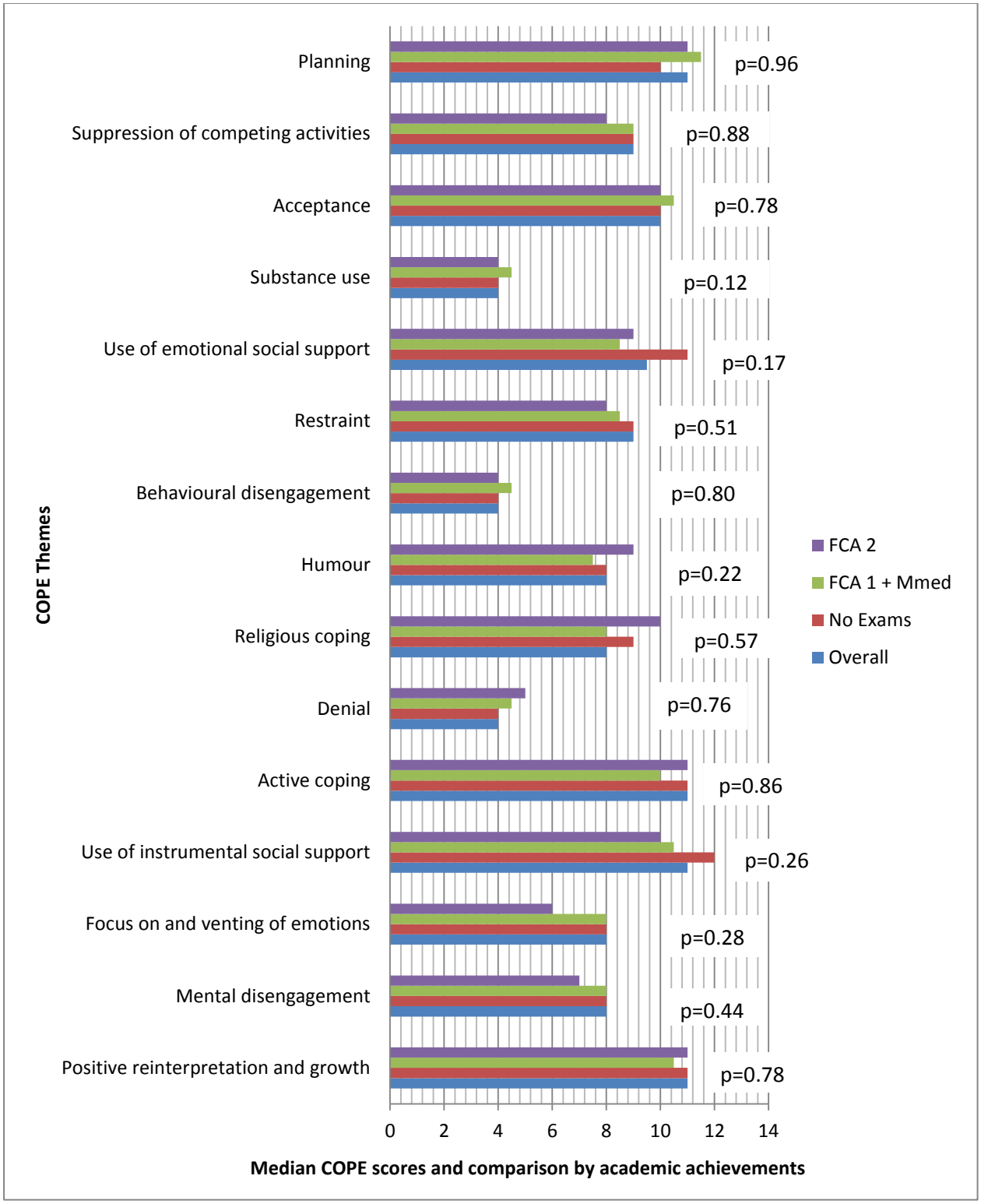
Figure 4.2 shows the coping strategies of junior and senior registrars. Junior registrars utilised instrumental social support (median 12) more than senior registrars.



*p value <0.05

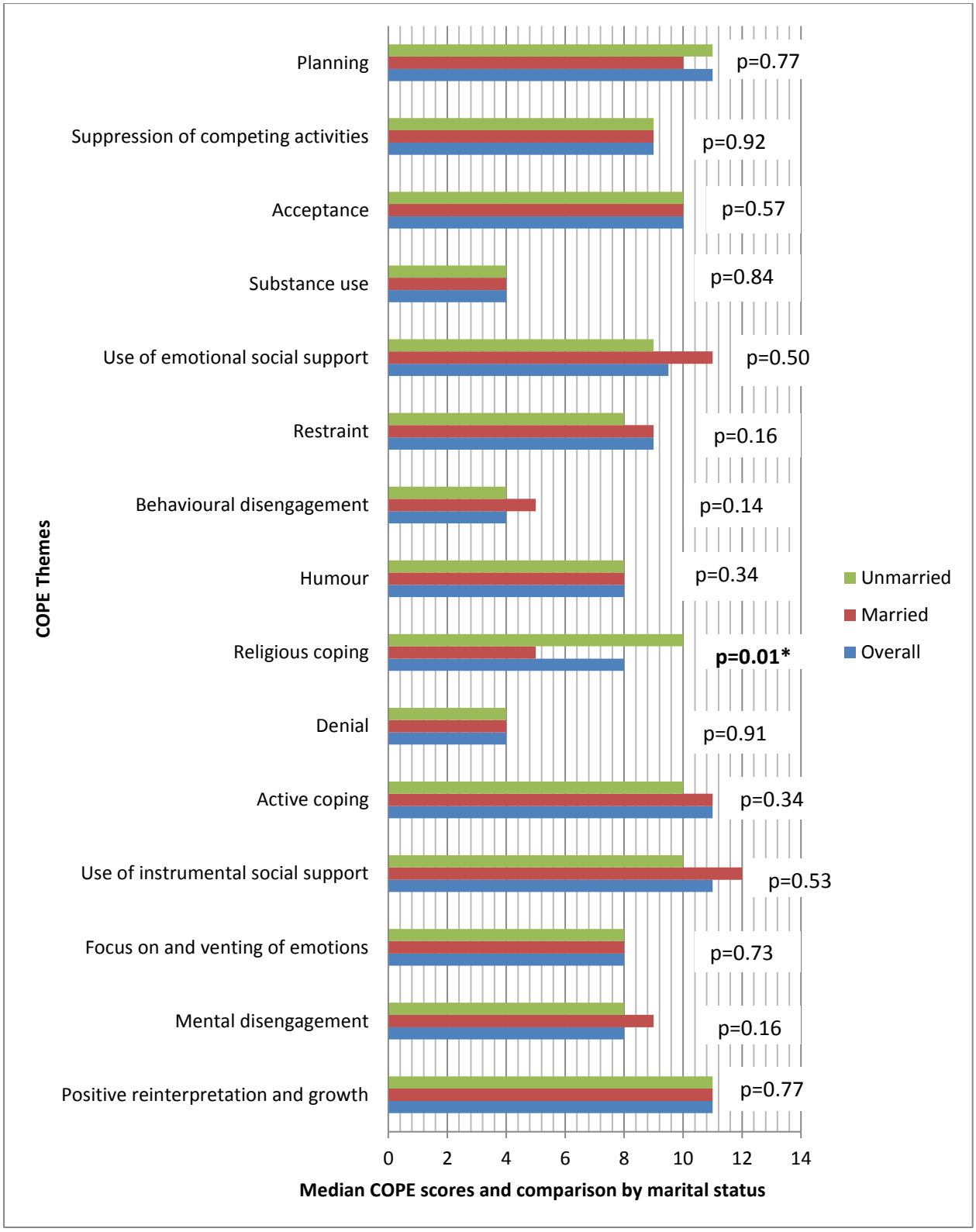
Figure 4.2 Median COPE Scores and comparison by years of registrar training

No difference was found amongst the three groups of academic achievements. These are show graphically in Figure 4.3



* P value <0.05

Figure 4.3 Median COPE scores and comparison by academic achievements

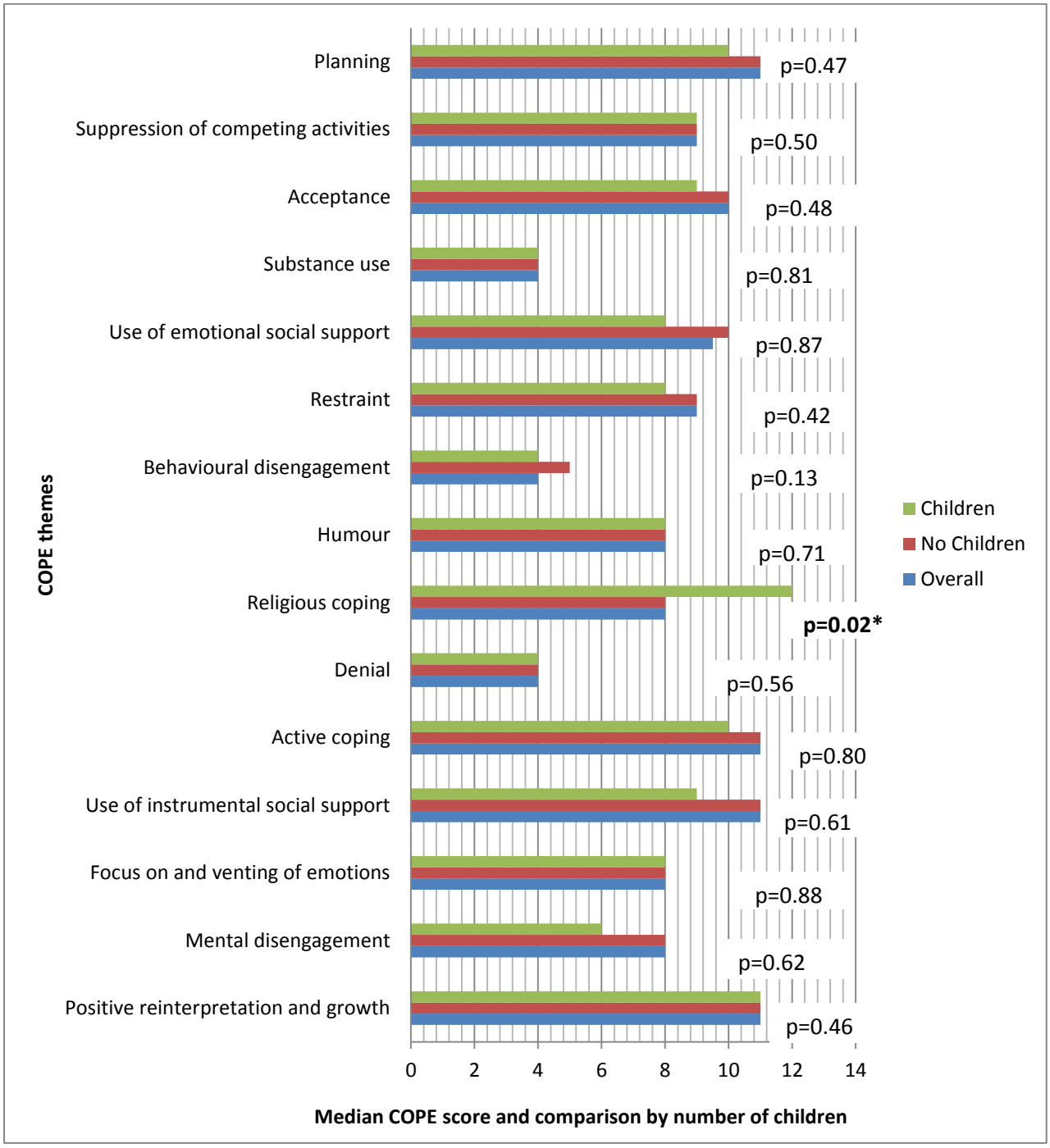


* P value <0.05

Figure 4.4 Median COPE scores and comparison by marital status

Marital status was grouped into 2 categories, married and unmarried, as “divorced” and “other” had no respondents. Registrars were originally grouped according to number of

children. These groups were combined into two groups, those with children and those without. Religious coping was adopted more frequently amongst married registrars (p=0.01) and registrars with children (p=0.02). Figure 4.4 depicts the coping strategies compared to marital status and Figure 4.5 shows these themes compared to registrars with or without children.



* P value <0.05

Figure 4.5 Median COPE score and comparison by number of children

4.3 Discussion

Stress within anaesthesiology is well documented in international literature (57), as are the many maladaptive coping strategies adopted which result in higher rates of suicide (93); alcohol abuse (89) and substance abuse (8, 10, 83, 84). Wits anaesthesiology registrars have higher stress score when compared to non-medical South Africans Excessive perceived stress can also culminate ultimately in occupational burnout. In a study of over a thousand French physicians in 2012, stress was proven as the main risk factor for emotional exhaustion and low personal accomplishment; both components of burnout (107). In Van Der Walt's (38) study in 2013, high levels of burnout (21%) were described amongst Wits anaesthesiologists. Age less than 41 years and anaesthetic experience of less than and equal to 8 years were both factors increasing burnout scores. (38) This study was the first of its kind to address workplace stress and burnout within anaesthesiology in South Africa and highlighted a problem echoed in a recent editorial to the South African Journal of Anaesthesia and Analgesia (37).

The PSS used in our report is not a diagnostic tool, so there were no limits to determine stressed individuals and only comparisons between individuals were permitted. The overall scores reported in this study were reported as both median and means for comparison with other studies. Our overall score was higher than those reported amongst non-medical low income adults (n=257) in Cape Town, Port Elizabeth and Durban in 2004.(56) In this population Hamad et al (56) reported the PSS scores were 18.6 (SD 6.7), with a mean of 17.5 among men and 19.6 among women ($p = 0.02$). The overall PSS score in our study was 21.48 (SD 7.86), higher than those reported by Hamad. It was also higher compared to 287 South African university athletes with overall scores of 18.96 (SD 4.01) in 2013 (104).

Internationally two studies have been conducted using PSS to describe stress in the health care environment. A PSS score of 28.67 (SD 5.32) was reported in 282 Indian nursing students in 2011 (103).Amongst 556 undergraduate dental students in Saudi Arabia (2010), the mean PSS score was 22.82(SD 3.99) (102). Both these studies had higher scores in comparison to Wits anaesthesiology registrars. The reason for this discrepancy is most likely multifactorial. Both cohorts of students were younger with less medical experience than the anaesthesiology registrars in our study. Both age and experience mitigate the perception of stress (15, 38, 62, 108). Another factor may be the differences in the various societies and

cultures. Ben-Bakr et al (108) commented on the higher stress levels amongst Saudi Arabians compared to westerners. The author attributed these differences to rapid industrialisation and modernisation which places more pressure on the younger generation to succeed in the workplace. There has also been a gradual disintegration of the extended family support in favour for a more conventional nuclear family unit. (108)

In our study higher PSS scores were observed in females 22.9 (SD 6.8) vs males 19.79 (SD 8.7). Unfortunately the study was not sufficiently powered to make this comparison but this finding was similar in the Indian and Saudi Arabian study (102-104). This could possibly be due to the fact that the appraisal of stress seems to be more excessive in females compared to males (109). Reasons for the differences in stress appraisal were proposed by Tamres et al (109) to be due to women performing "dual roles" with career and family responsibilities, and females generally have lower status occupations resulting often in low reward, high demand situations.

Within the group of Saudi Arabian dental students, higher perceived stress was experienced amongst students who were female, of advanced age and married. In comparison to male dental students, those who were more junior and unmarried reported the lowest levels of stress. (102) This was not a finding in our study although our study was not sufficiently powered for these comparisons.

Studies suggest that the experience of stress is eased with greater work experience and it has further been suggested that more mature doctors have lower levels of burnout. (110) Within anaesthesiology this statement is true for a number of studies conducted (15, 62-64).

Kawasaki et al (62) conducted a questionnaire survey in 2005 including 1010 Japanese anaesthesiologists. Levels of work stress were lower in anaesthesiologists with more than 10 years' experience and highest in those with less than 10 years' experience by 9 %. The authors proposed that this may be due to improved coping skills learnt with experience as both groups had similar workloads.

Nyssen (15) investigated stress amongst anaesthesiologists working in Belgium. He was unable to prove a significantly higher stress level in comparison to the general workplace stress levels. He did however find 40.4% of anaesthesiologists experienced high levels of

work exhaustion and the highest rate was amongst the training anaesthetists under the age of 30 years.

Within our study the population was limited to registrars within the 4 year training programme and breadth of experience was not tested. Peisah et al (110) found in 158 doctors in Australia, that older doctors have decreased levels of distress and burnout compared to younger doctors. This was attributed to "lessons learned over the years". The author suggests this is due to "increased confidence in the role of doctor, greater life experience and clinical wisdom". (110) Survival bias may also be a confounding factor. "Survival bias refers to the apparent decrease in work-related stress levels with increasing age", this may be due to early retirement or loss of those who cannot stand or take such stress (64, 110).

Coping strategies are influenced by personality, situational demands and the environment. Cultural and societal factors also model a person's perception of stress and how to manage stress. (111) Although coping does not absolutely decrease stress levels, it does attenuate the effects stress. (20)

In our report the most common coping strategies adopted by anaesthesiology registrars were positive reinterpretation and growth (median 11), use of instrumental social support (median 11), active coping (median 11) and planning (median 11). Denial (median 4), substance abuse (median 4) and behaviour disengagement (median 4) were the least adopted strategies. Encouragingly substance abuse appears to be an infrequently to never utilised strategy amongst Wits anaesthesiology registrars. This result may be confounded by underreporting.

In our report females had higher scores for venting of emotions (median 9) ($p=0.01$), mental disengagement (median 9) ($p=0.03$) and use of emotional social support (median 10.5) ($p=0.03$). These results do however need to be interpreted with caution in light of the statistics being underpowered for this comparison

Male anaesthesiology registrars adopted active planning (median 9) more than their female colleagues ($p=0.01$). The coping strategies of females tend to generally more emotion-focused and females tend to seek social support more frequently, in comparison to males

which stereotypically utilise problem-focused coping. (109) The reason for this difference can be due to socialisation differences, where female are taught to express their emotions appropriately and more freely. In contrast to men who are encouraged to express their emotions in a more "functional way". (109) The "constraint theory" has also been proposed wherein social and cultural constructs alter a person's coping strategies. (112)

The coping strategies were similar in registrars with regards to marital status, experience and having children, with the exception of religious coping. More registrars who were married and had children turned to religion as a form of coping. Although these comparisons were insufficiently powered to draw meaningful conclusions, religious coping has been found to be utilised more frequently amongst married people. (113) This may be in part due to people being more likely to engage in marriage if they are religious prior to marriage creating selection bias.

Emotion focused coping consists of strategies such as positive reinterpretation, acceptance of the problem, denial, turning to religion and seeking emotional social support from others (20). Emotion-focused coping, has been associated with mental illness in medical students and workplace stress and burnout among physicians (114). In another study including over 400 gastroenterology registrars and specialist in America, problem-focused coping strategies including active coping, planning, seeking social support, positive reinterpretation, and acceptance was associated with less burnout and distress. These coping strategies were also associated with fewer endoscopic complications.(115)

Cultural and societal influences have a major influence on creation a person's coping strategies (116). It affects not only the assessment of stress but also the coping goal and adopted coping strategy. (112) A cross-sectional survey of hospital doctors using the brief COPE (shortened 28 item questionnaire) was conducted in 2009 and 2011, in Germany and Australia respectively. Australian doctors got more emotional support, made use of religious coping and positive reinterpretation more often than German doctors. Whereas the German doctors use planning and instrumental social support more often than Australian doctors. The author attributed these differences in coping to the cultural and societal differences between German doctors and Australian doctors. (111) Saudi Arabian dental students adopted mainly behavioural disengagement, denial and venting.(102)

In Wits anaesthesiology registrars there was a combination of both emotion and problem focussed coping**.** The cultural and societal differences in South Africa together with the small sample does not allow for further meaningful conclusions to be drawn.

4.5 Summary

The results of this study have been presented in this chapter and discussed as per research objectives. The data presented include demographic data of the study population, a description and comparison of perceived stress and coping strategies as well as a discussion regarding these results.

Chapter 5: Summary, limitations, recommendations and conclusion

5.1 Introduction

In this chapter a summary of the study is given. The limitations will be addressed, recommendations made and a conclusion presented.

5.2 Study summary

5.2.1 Aim

The aim of this study was to describe the occupational stress and coping strategies of registrars working within the Department of Anaesthesiology at the University of Wits.

5.2.2 Objectives

The primary objectives were to describe the:

- levels of stress quantified by anaesthesiology registrars using the PSS, and
- common coping strategies, employed by anaesthesiology registrars using the COPE questionnaire.

The secondary objectives were to compare PSS score and COPE themes by:

- gender
- years of registrar training
- academic achievements
- number of hospitals worked in
- marital status
- number of children.

5.2.3 Methodology

A descriptive, prospective, contextual study design was used. Two validated questionnaires, the PSS and COPE, were chosen to describe the stress and coping of anaesthesiology registrars. The questionnaires were distributed to anaesthesiology registrars at the departmental academic meetings from May 2014 to November 2014. All registrars were invited to participate and those participating received an envelope containing the questionnaire and an information letter. It was estimated it would take fifteen minutes to

complete but on the recommendation of the Human Research Ethics Committee (Medical), registrars were allowed to take the questionnaire home to reflect. Both completed and uncompleted questionnaires were placed in the envelope provided, unlabelled and sealed to maintain anonymity. These envelopes were then placed in boxes provided at the meeting or boxes placed in the departmental tea rooms, in each of the hospitals.

The sample was realised by the response of 52 registrars (47%), which fell below the recommended number to adequately power the secondary objectives. The findings have been described and analysed using descriptive and inferential statistics.

5.2.4 Main findings

The overall PSS score was 21.48 (SD 7.8), higher than those reported amongst non-medical low income adults (56) and South African university athletes (104), 18.6 (SD 6.7) and 18.9 (SD 4.0) respectively. Slightly higher PSS scores were observed in our study in females compared with males, 22.9 (SD 6.8) vs 19.79 (SD 8.7).

The registrars made use all the fifteen coping strategies described in the COPE questionnaire. Denial, substance abuse and behaviour disengagement were the least adopted strategies. Positive reinterpretation and growth, use of instrumental social support, active coping and planning were the most commonly utilised strategies.

There were four differences in coping between females and men. The females had higher scores for venting of emotions, mental disengagement and use of emotional social support. Male anaesthesiology registrars adopted active coping more than their female colleagues. Junior registrars utilised instrumental social support more than senior registrars. Religious coping was adopted more frequently amongst married registrars and registrars with children. These comparisons were however secondary objectives and these results had to be interpreted with reservation as the study was inadequately powered due to the low response rate.

5.3 Limitations

Limitations of our study include a low response rate, which may result in non-responder bias. The response rate in our study was 47 %; in comparison with other studies on stress

amongst registrars in a variety of specialities, rates ranged from 35-71 % (64). It is a possibility that non responders suffer from greater levels of stress and are less motivated to complete the questionnaire. The participants were also allowed to take the questionnaires home to reflect on their responses as was instructed by the Human Research Ethics Committee (Medical); this may have resulted in increasing the number that were not returned.

Self-administered questionnaires have a number of limitations including incomplete answering of all the questions, the inability to obtain clarification on any of the questions and a desire amongst participants to provide the socially accepted responses. (99) The need to provide the correct answer may account for the low reported use of substances as a coping mechanism. This is contrast to comments made regarding the anaesthesiology community by Brannigan and Beeton (37).

The low response rate also resulted in the secondary objectives being underpowered to find a difference. This limited the number of meaningful conclusions that could be drawn and all comparisons need to be interpreted with caution.

The questionnaire did not allow for open responses, and although this was not the scope of this research report, additional stressors and coping strategies could not be identified. This was done to simplify data collection and interpretation, but stress and coping is complex and results from a number of external sources. Open responses may have allowed for the collection of richer data and allow further insights.

The results of our study may not be generalizable to any other departments and may only be applicable to anaesthesiology registrars affiliated to Wits.

5.4 Recommendations

5.4.1 Clinical practice

As mentioned previously, subsequent to the commencement of our study, the Wits anaesthesiology department has incorporated a mentorship programme; a wellness committee and the involvement of ICAS, a professional counselling and support service. This has increased the support available within the department. These services require ongoing

auditing to ensure they are effective and if further improvements are needed. The department also needs to continually promote and encourage to utilisation of these resources available to anaesthesiologists.

The inclusion of stress and time management training together with resilience training has also been shown to be beneficial in reducing stress scores (117) and may be considered within the department.

Registrars should be encouraged to take care of both their physical and mental well-being. This includes utilising regular leave, healthy eating habits and regular exercise. The Department and registrars may also benefit from fostering an open, supportive and "no blame" environment for those in distress.

5.5.2 Further research

Future research should be directed at looking at coping strategies adopted by more experienced anaesthesiologists. This may be better researched with qualitative methods.

Future study is also needed to identify successful strategies to reduce stress and improve the well-being the registrars. Further research that is adequately powered may allow identification of those the department at highest risk.

5.5 Conclusion

Anaesthesiology registrars working in Wits are more stressed than select communities in South Africa. Unfortunately there are no studies of stress and coping amongst doctors in South Africa. Comparisons could only be made with international studies. Increased stress places registrars at risk of depression (93), burnout (107), suicide (93), substance and alcohol abuse (8, 89) and place patient care at risk (11). Within the study there was no variable with regards to gender, marital status, years of experience, academic achievements or number of children that affected the levels of perceived stress reported. Unmanaged stress is a worldwide source of suffering and illness within anaesthesiology, our study reinforces this statement highlighting the importance of this issue. The coping strategies

adopted by anaesthesiology registrars are varied. These strategies need to be encouraged especially amongst other colleagues who are not coping.

References

1. Dickson D. Stress. Anaesthesia. 1996;51:523-4.
2. Kam P. Occupational stress in anaesthesia. Anaesthesia and Intensive Care. 1997;25:686-90.
3. Seeley H. The practice of anaesthesia-a stressor for the middle-aged? Anaesthesia. 1996;51:571-4.
4. Maslach C. Burnout-the cost of caring. Engelwood Cliffs: Prentice-Hall 1982.
5. Alexander B, Checkoway H, Nagahama S, Domino K. Cause-specific mortality risks of anaesthesiologists. Anesthesiology. 2000;93:922-30.
6. Bruce D, Eide K, Smith N, Seltzer F, Dykes M. A prosective survey of anesthesiologist mortality 1967-1971. Anesthesiology. 1974;41:71-4.
7. Spiegelman W, Saunders L, Mazze R. Addiction and anaesthesiology. Anesthesiology. 1984;60:335-40.
8. Lutsky I, Hopwood M, Abram S, Jacobson G, Haddox D, Kampine J. Psychoactive substance use among American anaesthesiologists: a 30-year retrospective study. Canadian Journal of Anaesthesia. 1993;40(10):915-21.
9. Fry R. Chemical dependency treatment outcomes of residents. Anesthesia and analgesia. 2006;103(6):1588.
10. Fry R. Substance abuse by anaesthetists in Australia and New Zealand. Anaesthesia and Intensive Care. 2005;33:248-55.
11. Fahrenkopf A, Sectish T, Barger L, Sharek P, Lewin D, Chiang V, et al. Rates of medication errors among depressed and burnt out residents: prospective cohort study. British Medical Journal. 2008;336(7642):488-91.
12. Thomas L, Valli A. Levels of Occupational stress in doctors working in a South African public-sector hospital. South African Medical Journal. 2006;96(11):1162-8.
13. Kain Z. Anesthesiologists and acute perioperative stress. Anaesthesia and Analgesia. 2002;95:177-83.
14. Karasek R. Job demands, job decision latitude amd mental strain. Implications for job redesign. Administative Science Quarterly. 1979;24:285-308.
15. Nyssen A. Occupational stress and burnout in anaesthesia. British journal of anaesthesia. 2003;90(3):333-7.
16. Subcommittee for postgraduate education and training. New requirements for the registration of specialists in South Africa: Health Professions Council of South Africa; 2010 [29 June 2012]. Available from: http://www.hpcsa.co.za/downloads/medical_dental/new_requirements_for_registration_of_specialists_in_sa.pdf.
17. Malone J, editor. Occupatinal stress, a practical approach. First ed. Great Britain: Butterworth-Heinemann; 1997.
18. Stedman's Medical Dictionary: Lippincott Williams and Wilkins; 2006. Available from: http://online.statref.com/document.aspx?fxid=8&docid=8918.
19. Cohen S, Kamarck T, Mermelstein R. A globel measure of percieved stress. Journal of Health and Social Behavior. 1983;24:385-96.
20. Carver C, Scheier M. Assessing coping strategies: A theoretically based approach. Journal of Personality and Social Psychology. 1989;56(2):267-83.
21. Carver C. You want to measure coping but your protocol's too long: consider the brief COPE. International Journal of Behavioural Medicine 1997;4(1):92-100.
22. World Medical Association Declaration of Helsinki - Ethical principles for medical research involving human subjects Fortaleza, Brazil: World Medical Association; 2013 [29 March 2014]. Available from: http://www.wma.net/en/30publications/10policies/b3/.

23. Guidelines for good practice in the conduct of clinical trials with human participants in South Africa2006 12 June 2012 [cited Department of Health. Available from: http://www.kznhealth.gov.za/research/guideline2.pdf.
24. Burns N, Grove S. Understanding quatitative research design. In: Henderson L, editor. The Practice of Nursing Research. 6 ed. Missouri, United States of America: Saunders Elsevier; 2009. p. 218-35.
25. Ohira H, Matsunaga M, Kimura K, Murakami H, Osumi T, Isowa T, et al. Chronic stress modulates neural and cardiovascular responses during reversal learning. Neuroscience. 2011;193:193 -204.
26. Pope C, Coldicott Y. No-one forgets a bad teacher. Medical Education. 2002;36(1):5-6.
27. Campeau S, Liberzon I, Morilak D, Ressler K. Stress modulation of cognitive and affective processes. Stress. 2011;14(5):503-19.
28. Yuen E, Wei J, Liu W, Zhong P, Li X, Yan Z. Repeated Stress Causes Cognitive Impairment by Suppressing Glutamate Receptor Expression and Function in Prefrontal Cortex. Neuron. 2012;73(5):962-77.
29. Halbesleben J, Rathert C. Linking physician burnout and patient outcomes: Exploring the dyadic relationship between physicians and patients. Health Care Management Review. 2008;33(1):29-39.
30. ICAS: Employee health and wellness, Our services [15 January 2015]. Available from: http://www.icas.co.za/employee-health-wellness/overview.
31. Lunberg U. Workplace stress. In: Fink G, McEwen B, De Kloet R, Ruben R, Chrousis G, Steptoe A, et al., editors. Encyclopedia of stress. 2nd ed. Oxford: Eisevier; 2007. p. 871-8.
32. McCue C. The effects of stress on physicians and their medical practice. New England Medical Journal. 1982;306(8):458-9.
33. Sacker A, Bartley M, Frith D, Fitzpatrick R, Marmot M. The relationship between job strain and coronary heart disease: evidence from an english sample of the working male population. Psychological Medicine. 2001;31(02):279-90.
34. Schnall P, Schwartz J, Landsbergis P, Warren K, Pickering T. Relation between job strain, alcohol, and ambulatory blood pressure. Hypertension. 1992;19(5):488-94.
35. Howse J. The provinces at a glance: who's spending what where? South African Medical Journal. 2000;90(5):468.
36. Bateman C. Stressed doctors thrown an MPS lifeline. South African Medical Journal. 2010;100(1):33-5.
37. Brannigan L, Beeton A. The impaired clinician and the health and wellness of practitioners in anaesthesia and critical care. South African Journal of Anaesthesia and Analgesia. 2013;19(3):137.
38. Van der Walt N. Burnout: when there is no more fuel for the fire. South African Journal of Anaesthesia and Analgesia. 2013;19(3):135-6.
39. Frankenhaeuser M, Lunberg U, Chesney M. Women, work, and health: stress and opportunities. New York: Plenum Press; 1991.
40. Shackelton R, Siergrist J, Link C, Marceau L. Work stress in primary care physicians in the US, UK and German health care systems Social Science and Medicine. 2010;71(2):298-304.
41. Karasek R, Theorell T. Healthy work: Stress, productivity, and the reconstruction of working life. New York: Basic Books; 1990.
42. Siegrist J, Starke D, Chandola T, Godin I, Marmot M, Niedhammer I, et al. The measurement of effort–reward imbalance at work: European comparisons. Social Science and Medicine. 2004;58(8):1483-99.
43. De Jonge J, Bosma H, Peter R, Siegrist J. Job strain, effort-reward imbalance and employee well-being: a large-scale cross-sectional study. Social Science and Medicine. 2000;50(9):1317-27.

44. Ostry A, Kelly S, Demers P, Mustard C, Hertzman C. A comparison between the Effort-Reward Imbalance and Demand-Control models. BMC public health. 2003;3:10- 9.
45. Peter R, Alfredsson L, Hammar N, Siegrist J, Theorell T, Westerholm P. High effort, low reward, and cardiovascular risk factors in employed Swedish men and women: baseline results from the WOLF Study. Journal of Epidemiology and Community Health. 1998;52(9):540-7.
46. Siegist J. Adverse health effects of high-effort/ low-reward conditions. Journal of Occupational Health and Psychology. 1996;1:27-41.
47. Tsutsumi A, Tsutsumi K, Kayaba K, Theorell T, Nago N, Kario K, et al. Job Strain and biological Coronary Risk Factors: A Cross-Sectional Study of Male and Female Workers in a Japanese Rural District. International Journal of Behavioral Medicine. 1998;5(4):295-8.
48. Weixian X, Yimin L, Lijun J, Yanhong G, Wei G. The association between effort–reward imbalance and coronary atherosclerosis in a Chinese sample. American journal of industrial medicine. 2010;53(7):655-61.
49. Doef M, Van Der Maes S. The job Demand-Control (Support) Model and psychological well-being: a review of 20 years of empirical research. Work & Stress.13(2):87-114.
50. Barrera M. Who's to Blame for Job Strain? 2008 [18 June 2012]. Available from: http://ohsonline.com/articles/2008/06/whos-to-blame-for-job-strain.aspx.
51. De Jonge J, Dollard MF, Dormann C, Le Blanc PM, Houtman ILD. The Demand-Control model: specific demands, specific control, and well-defined groups. International Journal of Stress Management. 2000;7(4):269-87.
52. Johnson J, Hall E. Job strain, workplace social support and cardiovascular disease. A cross-sectional study of a random sample of the Swedish working population. Amercian Journal of Public Health. 1988;78:1336-62.
53. Siegrist J. Adverse health effects of high-effort/low-reward conditions. Journal of Occupational Health Psychology. 1996;1(1):27-41.
54. Effort-reward imbalance at work - theory, measurement and evidence Duesseldorf University, Duesseldorf: Department of Medical Sociology; 2008 [june 2012]. Available from: http://www.uni-duesseldorf.de/medicalsociology/effort-reward_imbalance_at_wor.112.0.html.
55. Lee E-H. Review of the Psychometric Evidence of the Perceived Stress Scale. Asian Nursing Research. 2012;6(4):121-7.
56. Hamad R, Fernald LCH, Karlan DS, Zinman J. Social and economic correlates of depressive symptoms and perceived stress in South African adults. Journal of Epidemiology and Community Health 2008;62(6):538-44.
57. Lyons S, Atkinson R, Aitkenhead A, Brown A, Burrows M, Dickson D, et al. Stress in anaesthetists London: The association of anaesthetists of Great Britain and Ireland; 1997 [12 june 2012]. Available from: http://www.aagbi.org/sites/default/files/stress97.pdf.
58. Sun G, Saloojee H, Jansen Van Rensburg M, Manning D. Stress during internship at three Johannsburg hospitals. South African Medical Journal. 2008;98(1):33-5.
59. Kinzl JF, Knotzer H, Traweger C, Lederer W, Heidegger T, Benzer A. Influence of working conditions on job satisfaction in anaesthetists. British journal of anaesthesia. 2005;94(2):211-5.
60. Jackson SH. The role of stress in anaesthetists's health and well-being. Acta anaesthesiologica Scandinavica. 1999;43(6):583-602.
61. Kain Z, Chan K, Katz J, Nigam A, Fleisher L, Dolev J, et al. Anesthesiologists and acute perioperative stress: a cohort study. Anesthesia and analgesia. 2002;95(1):177-83.
62. Kawasaki K, Sekimoto M, Ishizaki T, Imanaka Y. Work stress and workload of full-time anesthesiologists in acute care hospitals in Japan. Journal of Anesthesia. 2009;23(2):235-41.
63. Morais A, Maia P, Azevedo A, Amaral C, Tavares J. Stress and burnout among Portuguese anaesthesiologists. European Journal of Anaesthesiology. 2006;23(05):433-9.

64. Chia A, Irwin M, Lee P, Lee T, Man S. Comparison of stress in anaesthetic trainees between Hong Kong and Victoria, Australia. Anaesthesia and Intensive Care. 2008;36(6):855-62.
65. Larsson J, Rosenqvist U, Holmstrom I. Being a young and inexperienced trainee anesthetist: a phenomenological study on tough working conditions. Acta anaesthesiologica Scandinavica. 2006;50:653-8.
66. Larsson J, Rosenqvist U, Holmström I. Enjoying work or burdened by it? How anaesthetists experience and handle difficulties at work: a qualitative study. British journal of anaesthesia. 2007;99(4):493-9.
67. Shidhaye R, Divekar D, Dhulkhed V, Goel G, Gupta A. Evaluation of stressors and coping strategies for stress in indian anaesthesiologists. Indian Journal of Anaesthesia. 2011;55:193-8.
68. Kluger MT, Laidlaw T, Khursandi DS. Personality profiles of Australian anaesthetists. Anaesthesia and Intensive care. 1999;27(3):282-6.
69. Smith AF. Reaching the parts that are hard to reach: expanding the scope of professional education in anaesthesia. British journal of anaesthesia. 2007;99(4):453-6.
70. Markwell A, Wainer Z. The health and wellbeing of junior doctors: insights from a national survey. Medical Journal of Australia. 2009;191(8):444.
71. Grewal K, Gravely-Witte S, Stewart DE, Grace SL. A simultaneous test of the relationship between identified psychosocial risk factors and recurrent events in coronary artery disease patients. Anxiety, Stress & Coping. 2011;24(4):463-75.
72. Greenlund K, Kiefe CI, Giles W, Liu K. Associations of Job Strain and Occupation with Subclinical Atherosclerosis: The CARDIA Study. Annals of epidemiology. 2010;20(5):323-31.
73. Gun Kang M, Baek Koh S, Suk Cha B, Ku Park J, Koo Baik S, Jin Chang S. Job stress and cardiovascular risk factors in male workers. Preventive medicine. 2005;40(5):583-8.
74. Schwabe L, Wolf O. Stress-induced modulation of instrumental behavior: From goal-directed to habitual control of action. Behavioural brain research. 2011;219(2):321-8.
75. Wallace J, Lemaire J, Ghali W. Physician wellness: a missing quality indicator. Lancet. 2009;374:1714-21.
76. Gordon P. Wrong drug administration errors amongst anaesthetsts in a South African hospital. South African Journal of Anaesthesia and Analgesia. 2004;May:7-8.
77. Muldary T. Burnout and health professionals:Manifestations and management. California: Capistrano Press; 1983.
78. Joseph S, Linley P. Beneficial effects of stress. In: Fink G, McEwen B, De Kloet R, Ruben R, Chrousis G, Steptoe A, et al., editors. Encyclopedia of stress. 2nd ed. Oxford: Elsevier; 2007. p. 650-3.
79. Folkman S, Lazarus R. An Analysis of Coping in a Middle-Aged Community Sample. Journal of Health & Social Behavior. 1980;21(3):219-39.
80. Isaksson R, Tyssen R, Hoffart A, Sexton H, Aasland O, Gude T. A three-year cohort study of the relationship between coping, job stress and burnout after a counselling intervention for help-seeking physicians. BMC health services research. 2010;10:213-26.
81. Lemaire J, Wallace J. Not all coping stratergies are created equal: a mixed methods study exploring physicians' self reported coping strategies. BMC health services research. 2010;10:208-18.
82. Booth J, Grossman D, Moore J, Lineberger C, Reynolds JD, Reves J, et al. Substance Abuse Among Physicians: A Survey of Academic Anesthesiology Programs. Anesthesia & Analgesia. 2002;95(4):1024-30.
83. Bryson E, Silverstein J. Addiction and substance abuse in anaesthesia. Anesthesiology. 2008;109:905-17.
84. Gravenstein J, Kory W, Marks R. Drug abuse by anaesthesia personnel. Anaesthesia and Analgesia. 1983;62:467-72.

85. Kintz P, Villain M, Dumestre V, Cirimele V. Evidence of addiction by anaesthesiologists as documented by hair analysis. Forensic science international. 2005;153(1):81-4.
86. Collins GB, McAllister MS, Jensen M, Gooden TA. Chemical Dependency Treatment Outcomes of Residents in Anesthesiology: Results of a Survey. Anesthesia & Analgesia. 2005;101(5):1457-62.
87. Gold M, Graham N, Goldberger B. Second-hand and third-Hand drug exposures in the operating room: a factor in anaesthesiologists' dependency on fentanyl. Journal of addictive diseases. 2010;29(3):280-1.
88. Global Status Report on Alcohol and Health 2011: South Africa Geneva: World Health Organisation; 2011 [21 June 2012]. Available from: http://www.who.int/substance_abuse/publications/global_alcohol_report/en/index.html.
89. Juntunen J, Asp S, Olkinuora M, Aarimaa M, Strid L, Kauttu K. Doctors' drinking habits and consumption of alcohol. British Medical Journal. 1988;297(951-954).
90. Oreskovich M, Kaups K, Balch C, Hanks J, Satele D, Sloan J, et al. Prevalence of alcohol use disorder among American surgeons. Archives of Surgery. 2012;147(2):168-74.
91. Burrows S, Laflamme L. Suicide mortality in South Africa. A city-level comparison across socio-demographic groups. Social Psychiatry and Psychiatric Epidemiology,. 2006;41(2):108-14.
92. Mars B, Burrows S, Hjelmeland H, Gunnell D. Suicidal behaviour across the African continent: a review of the literature. BMC public health. 2014;14:606.
93. Schoeffler P, Duale C, Walder B. Risks of being an anaesthesiologist. European Journal of Anaesthesiology. 2011;28(11):756-7.
94. Lindfors P, Meretoja O, Luukkonen R, Elovainio M, Leino T. Suicidality among Finnish anaesthesiologists. Acta anaesthesiologica Scandinavica. 2009;53(8):1027-35.
95. Schwarzer R, Schwarzer C. Handbook of coping: A critical survey of coping instruments New York1996.
96. Carver C, Scheier M. Vigilant and avoidant coping in two patient samples. Krohne W, editor. Seattle: Hogrefe & Huber; 1993.
97. Van der Colff JJ, Rothmann S. Occupational stress, sense of coherence, coping, burnout and work engagement of registered nurses in South Africa. South African Journal of Industrial Psychology. 2009;35:1-10.
98. Pienaar J, Rothmann S, van de Vijver FJR. Occupational Stress, Personality Traits, Coping Strategies, and Suicide Ideation in the South African Police Service. Criminal Justice and Behavior. 2007;34(2):246-58.
99. Brink HI. Fundamentals of research methodology for health care professionals. 2 ed. Cape Town: Juta; 1999.
100. Jamieson S. Likert scales: how to (ab)use them. . Medical Education. 2004;38:121-1218.
101. Murray J. Likert Data: What to Use, Parametric or Non-Parametric? International Journal of Business and Social Science. 2013;4(11):258-64.
102. Al-Sowygh ZH. Academic distress, perceived stress and coping strategies among dental students in Saudi Arabia. The Saudi Dental Journal. 2013;25(3):97-105.
103. Singh A, Chopra M, Adiba S, Mithra P, Bhardwaj A, Arya R, et al. A descriptive study of perceived stress among the North Indian nursing undergraduate students. Iranian Journal of Nursing and Midwifery Research. 2013;18(4):340-2.
104. Surujlali JVZ, Y;Nolan, VT. Perceived stress and coping skills of university student-athletes and the relationship with life satisfaction. African Journal for Physical, Health Education, Recreation and Dance. 2013;19(4:2):1047-59.
105. Botma Y, Greeff M, Mulaudzi M, Wright S. Research in Health Sciences. Pinelands, Cape Town Pearson Education South Africa 2010.

106. Litman J. The COPE inventory: Dimensionality and relationships with approach- and avoidance-motives and positive and negative traits. Personality and Individual Differences. 2006;41:273-84.
107. Lesage F-X, Berjot S, Altintas E, Paty B. Burnout Among Occupational Physicians: A Threat to Occupational Health Systems?—A Nationwide Cross-sectional Survey. Annals of Occupational Hygiene. 2013;57(7):913-9.
108. Ben-Bakr KIS, A ; Jefri, OA. Occupational stress in different organizations: a Saudi Arabian survey. Journal of Managerial Psychology. 1995;10(5):24-8.
109. Tamres LJ, D; Helgesan, VS. Sex differences in coping behavior: A meta-analytic review and an examination of relative coping. Personality and Social Psychology Review. 2002;6(1):2-30.
110. Peisah C, Latif E, Wilhelm K, Williams B. Secrets to psychological success: Why older doctors might have lower psychological distress and burnout than younger doctors. Aging & Mental Health. 2009;13(2):300-7.
111. Mache S. Coping with job stress by hospital doctors: a comparative study. Wiener Medizinische Wochenschrift. 2012;162:440–7.
112. Rosario M, Shinn, M., Morch, H., & Huckabee, C. B. . Gender differences in coping and social supports: Testing socialization and role constraint theories. Journal of Community Psychology. 1988;16:55-69.
113. Chatters LT, RJ; Jackson, JS; and Lincoln, KD. Religious coping among African Americans, Caribbean Blacks and Non-Hispanic Whites. Journal of Community Psychology. 2008;36(3):317-82.
114. Isaksson R, Tyssen R, Hoffart A, Sexton H, Aasland OG, Gude T. A three-year cohort study of the relationships between coping, job stress and burnout after a counselling intervention for help-seeking physicians. BMC public health. 2010;10:213.
115. Taft T, Kefer. L, Keswani, RN. Friends, alcohol, and a higher power: an analysis of adaptive and maladaptive coping strategies among gastroenterologists. Journal of clinical gastroenterology. 2011;45(8):76-81.
116. Chi-Ah C, Moos R, Cronkite R. Handbook of multicultural perspectives on stress and coping interantional and cultural psychology 2006.
117. Sood A, Prasad K, Schroeder D, Varkey P. Stress Management and Resilience Training Among Department of Medicine Faculty: A Pilot Randomized Clinical Trial. Journal of General Internal Medicine. 2011;26(8):858-61.

Appendix 1: Questionnaire

Please circle the most appropriate option:				
Gender	Male		Female	
Year of anaesthetic training (as registrar)	1	2	3	4
Academic achievements to date	FCA 1	FCA 2	MMed	
Hospitals where I have worked	CMJAH	BARA	DGMC	HJH
	RMMCH	Klerksdorp		
Marital status	Single	Married	Divorced	Other
Number of children	0	1	2	> 2

Perceived Stress Scale

The questions in this scale below ask you about your feelings and thoughts during the LAST MONTH. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

0 = Never 1 = Almost never 2 = Sometimes 3 = Fairly often 4 = Very often

1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the last month, how often have you been angered because of things that are out of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

COPE Questionnaire

Please respond to each of the following items by circling the most accurate answer for YOU. Indicate what YOU usually do when YOU experience a stressful event.

1 = I usually don't do this at all **2 = I usually do this**

3 = I usually do this a medium amount **4 = I usually do this a lot**

1. I try to grow as a person as a result of the experience.	1	2	3	4
2. I turn to work or other substitute activities to take my mind off things.	1	2	3	4
3. I get upset and let my emotions out.	1	2	3	4
4. I try to get advice from someone about what to do.	1	2	3	4
5. I concentrate my efforts on doing something about it.	1	2	3	4
6. I say to myself "this is not real".	1	2	3	4
7. I put my trust in God.	1	2	3	4
8. I laugh about the situation.	1	2	3	4
9. I admit to myself that I can't deal with it, and I quit trying.	1	2	3	4
10. I restrain myself from doing anything too quickly.	1	2	3	4
11. I discuss my feelings with someone.	1	2	3	4
12. I use alcohol or drugs to make myself feel better.	1	2	3	4
13. I get used to the idea that it happened	1	2	3	4
14. I talk to someone to find out more about the situation.	1	2	3	4
15. I keep myself from getting distracted by other thought and activities.	1	2	3	4
16. I daydream about things other than this.	1	2	3	4
17. I get upset, and am really aware of it.	1	2	3	4
18. I seek God's help.	1	2	3	4
19. I make a plan of action.	1	2	3	4
20. I make jokes about it.	1	2	3	4

21. I ask people who have had similar experiences what they did.	1	2	3	4
22. I feel a lot of emotional distress and find myself expressing those feelings a lot.	1	2	3	4
23. I take direct action to get around the problem.	1	2	3	4
24. I accept that this has happened and that it can't be changed.	1	2	3	4
25. I hold off doing anything about it until the situation permits.	1	2	3	4
26. I try to get emotional support from friends and family.	1	2	3	4
27. I just give up trying to reach my goal.	1	2	3	4
28. I take additional action to try get rid of the problem.	1	2	3	4
29. I try to lose myself for a while by drinking alcohol or taking drugs.	1	2	3	4
30. I refuse to believe that it has happened.	1	2	3	4
31. I let my feelings out.	1	2	3	4
32. I try to see it in a different light, more positive.	1	2	3	4
33. I talk to someone who can do something concrete about the problem.	1	2	3	4
34. I sleep more than usual.	1	2	3	4
35. I try to come up with a strategy about what to do.	1	2	3	4
36. I focus on dealing with this problem, and if necessary let other things slide a little.	1	2	3	4
37. I get sympathy and understanding from someone	1	2	3	4
38. I drink alcohol and take drugs, in order to think about it less.	1	2	3	4
39. I kid about it	1	2	3	4
40. I give up the attempt to get what I want.	1	2	3	4
41. I look for something good in what is happening.	1	2	3	4
42. I think about how I might best handle the problem.	1	2	3	4
43. I pretend that it hasn't really happened.	1	2	3	4
44. I make sure not to make matters worse by acting too soon.	1	2	3	4
45. I try to prevent other things from interfering with my efforts at dealing with this.	1	2	3	4
46. I go to movies, or watch TV, to think about it less.	1	2	3	4
47. I accept the reality of the fact that it happened.	1	2	3	4

48.I try to find comfort in my religion	1	2	3	4
49. I force myself to wait for the right time to do something.	1	2	3	4
50. I make fun of the situation.	1	2	3	4
51. I reduce the amount of effort I'm putting into solving the problem.	1	2	3	4
52. I talk to someone about how I feel.	1	2	3	4
53. I use alcohol and drugs to help me get through it.	1	2	3	4
54. I learn to live with it.	1	2	3	4
55. I put aside other activities to concentrate on this.	1	2	3	4
56. I think hard about what steps to take.	1	2	3	4
57. I act as though it hasn't even happened.	1	2	3	4
58. I do what has to be done, one step at a time.	1	2	3	4
59. I learn something from the experience.	1	2	3	4
60. I pray more than usual.	1	2	3	4

Thank you for your time and participation.

Please place the questionnaire in the envelope provided and seal.

<u>Do not</u> put your name or any identifying data on the envelope.

References

Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. Journal of Health & Social Behaviour. 1983;24:385-96.

Carver C, Scheier M. Assessing coping strategies: A theoretically based approach. Journal of Personality and Social Psychology. 1989;56(2):267-83

Appendix 2: Information letter

Dear colleague,

My name is Cara Redelinghuys and I am an anaesthesiology registrar, affiliated to Wits. I would like to invite you to participate in a research study, “Occupational stress and coping strategies of registrars, working within the Department of Anaesthesiology, affiliated to the University of the Witwatersrand”, which will be handed in to the Wits University Department of Health Sciences as part of my MMed degree.

I wish to describe the levels of stress experienced by anaesthesiology registrars and their coping strategies. The information will be obtained with the use of self-reporting questionnaires, focussing on stress and coping.

The study has been approved by the Human Research Ethics Committee (HREC) (Medical) M120734 and Postgraduate Committee of the University of the Witwatersrand.

Your participation in this study is entirely voluntary. There is no possible penalty or repercussion if you do not participate. You are free to withdraw from the study at any time, without having to provide a reason.

Your participation in this study is entirely anonymous. Your questionnaire will in no way identify you and no identifying information will be collected. Results published will have no identifying data and will be made available to participants.

This questionnaire should only take approximately 10 to 15 minutes to complete. Once completed, your questionnaire will be placed in the sealed unlabelled envelope provided. The contents of the questionnaire will only be viewed by my research supervisors and self. All questionnaire completed or uncompleted must please be returned to the box provided in the sealed envelope by the end of the meeting. Alternatively if you wish to complete it later, please return to the boxes provided in the Departments office in CMJAH, DGMC, HJH/ RMMCH and CHBAH.

The study offers no benefit to participants but may identify a potential problem within the Department of Anaesthesia.

By completing this questionnaire your consent to take part in this study is implied. Please ensure that you have read and understood all the above information before completing it.

Thank you for taking the time to read this letter. If you have any questions or concerns with regard to the study, you may contact the following people with your queries:

- Professor Cleaton-Jones (chairperson of the HREC): 011 717 1234
- Cara Redelinghuys (researcher): 0767385493.

Yours sincerely,

Cara Redelinghuys (researcher)

Anybody feeling stressed and not coping?

MPS members:

Independent Counselling and Advisory Services (ICAS), specialising in counselling support for professionals.

0800 982 766

Non MPS:

07960 44 249 Free drug and alcohol counseling in Johannesburg

Appendix 3: the Human Research Ethics Committee (Medical) approval

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Cara Redelinghuys

CLEARANCE CERTIFICATE	**M120734**
PROJECT	Occupational Stresst and Coping Strategies of Registrars, Working within the Department of Anaesthesiology, Affiliated to the University of the Witwatersrand
INVESTIGATORS	Dr Cara Redelinghuys.
DEPARTMENT	Department of Anaesthesiology
DATE CONSIDERED	27/07/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 28/03/2014 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Ms Juan Scribante

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix 4: Post Graduate approval

Faculty of Health Sciences
Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172040

Reference: Ms Thokozile Nhlapo
E-mail: thokozile.nhlapo@wits.ac.za

27 March 2014
Person No: 700249
PAG

Dr C Redelinghuys
Unit 49 Vleilourie
61 Vlei Road
Rynfield
Benoni
1501
South Africa

Dear Dr Redelinghuys

Master of Medicine: Approval of Title

We have pleasure in advising that your proposal entitled *Occupational stress and coping strategies of registrars, working within the Department of Anaesthesiology, affiliated to the University of the Witwatersrand* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

Appendix 5: Questionnaire approvals

COPE Questionnaire permission

Charles S. Carver ccarver@miami.edu

I apologize for this automated reply. All measures I have developed are available for research and teaching applications without charge and without need to request permission; we ask only that you cite their source in any report that results. This also means please do not ask me to send you a letter authorizing the use of a scale, because this message is all I am going to send. If you wish to use a measure for a purpose other than teaching or research, you must also contact the copyright holder, the publisher of the journal in which the measure was published.

Information concerning the measure you are asking about can be found at the website below. I think most of your questions will be answered there. If I know for sure that there is a translation of a scale published in a language other than English, which information will be found there. If no information is there about the language of your interest, that means I do not know of a published translation. You are free to do your own. Please do not ask for a manual. There is no manual. Read the articles.

If questions remain, do not hesitate to contact me. Good luck in your work.

http://www.psy.miami.edu/faculty/ccarver/CCscales.html

PSS questionnaire permission

Ellen Conser conser@andrew.cmu.edu

Permission for the use of the PSS scale is not necessary when the use is for nonprofit academic purposes.

http://www.psy.cmu.edu/~scohen/scales.html