PERSONALITY PROFILE OF ANAESTHETISTS IN A DEPARTMENT OF ANAESTHESIOLOGY

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Declaration

I, Craig Segal, declare that this Research Report is my own, unaided work. It is being submitted for the Masters of Medicine in the branch of Anaesthesiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

Signed

Fourth day of *August* 2017 in Johannesburg, South Africa

Presentations

- E-poster presentation at South African Society of Anaesthesiologists Annual Congress 2017

Abstract

Background: Personality assessment has potential implications in anaesthesiology for recruitment into specialist programs, performance outcomes and identifying risk for burnout or psychological distress. The personality traits of anaesthetists can predispose them to occupational stress and burnout. Moreover, anaesthesiology is an inherently stressful workplace. Different researchers have found personality types to be prominent in subsets of doctors. The aim of this study was to describe the personality profile of the anaesthetists working in a department of Anaesthesiology.

Methods: A descriptive, prospective, contextual study design was used. The Short Temperament-Character Inventory (TCI-140) is a self administered personality questionnaire and was used to describe the personality profile of anaesthetists.

Results: Anaesthetists in the sample had low Novelty Seeking (median 25%), average Harm Avoidance (median 37%), average Reward Dependence (median 47%), high Persistence (median 70%), high Self Directness (median 87%), high Cooperativeness (median 73%) and average Self Transcendence (median 34%). Forty participants were classified as extreme temperament personality types. One participant was an immature personality type.

Conclusions: : Male anaesthetists scored as low Harm Avoidance compared to average for female anaesthetists. There was no significant difference between anaesthetists of different ages. Senior anaesthetists scored low for Harm Avoidance and Self Transcendence compared to average for junior anaesthetists for those dimensions. The personality profile of anaesthetists in this sample is similar to other studies and reflects qualities required for the practice of anaesthesiology.

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List of abbreviations

TCI	Temperament-Character Inventory
MBTI®	Myers-Briggs Type Indicator®
Cattell 16PF	Cattell 16 Personality Factor
FFM	Five-Factor Model
NS	Novelty Seeking
HA	Harm Avoidance
RD	Reward Dependence
PS	Persistence
SD	Self Directedness
CO	Cooperativeness
ST	Self Transcendence
CPI	California Psychological Inventory
SII	Strong Interest Inventory
IPIP-NEO	International Personality Item Pool – Neuroticism, Extraversion and Openness questionnaire
SAJAA	Southern African Journal of Anaesthesia and Analgesia
DSM	Diagnostic and Statistical Manual of Mental Disorders
MBI-HSS	Maslash Burnout Inventory - Human Services Survey

Section 1: Literature review

1.1 Introduction

The literature review will explore a short history of personality assessments, the popular personality assessments and personality assessments describing anaesthetists.

1.2 Personality assessments

1.2.1 Introduction

Personality Psychology is a relatively new field that has developed over the last century. It is "the scientific study of the psychological forces that make people unique to themselves" (1). Personality theories have arisen from the work of different fields. Theories have been described by philosophers and insightful thinkers for example like Sigmund Freud; the Cattell 16 personality traits is derived from factor analysis of the English language. Application of concepts from other fields such as neuroscience and the neuropsychiatric models. See Table 1.1 from Personality: classic theories and modern research, for a brief history of Personality Psychology related to historical events (1).

Personality assessments seek to quantify important characteristics of personality and to develop accurate methods of measurement of those characteristics. Personality assessments attempt to explore and explain the meaning of characteristics that they describe (2). Personality assessments may require interpretation by and examiner such as in directed interviews or independent of observer judgement as in questionnaires. Personality assessments should have good reliability, internal consistency and test-retest reliability (1).

Personality assessments can be divided by theoretical and methodological basis. Different assessment designs have inherent weaknesses and biases. Examples of personality assessment methods include self-reported (e.g. questionnaire), Q-sort (e.g. a subject is given a stack of cards with various characters and is asked to sort them into piles), ratings by others, biological tests, behavioural observation, interview, expressive behaviour, document analysis, projective tests (1).

There is a debate in the literature about the use of personality assessment in personnel selection. The ongoing use of personality assessment to explain and predict behaviour in the work place and for recruitment, supports continuing investigation of personality (3, 4). There has been a significant increase in research done on personality since the 1980s (5). According to Tett et al. (5), the growing popularity of personality in personnel selection is due to the advent of the Five-Factor Model and the growing evidence in the literature to support the use of personality assessments. The Five-Factor Model has made personality assessment more accessible and manageable (4).

The following are descriptions of a few commonly used personality assessments. The Temperament Character Inventory (TCI) will be discussed in more detail as it is the assessment tool of this study.

Table 1.1 History of Personality Psychology (1)

Time	Society Events	Psychology Events
1800s	1861-1865 American Civil War 1880s Immigration to U.S. begins	1880s Francis Galton measures individual differences
1900-1930	1900-1921 Women seek right to vote 1914-1918 World War I 1920s Roaring twenties	1900 Sigmund Freud publishes *Interpretation of Dreams* 1905 Binet and Simon begin first valid intelligence testing 1906 Ivan Pavlov works on conditioning of nervous system 1917 Personality testing begins in U.S. Army 1919 J.B. Watson founds behaviourism 1920s Kurt Lewin studies Gestalt psychology in Berlin; flees Nazis to U.S. in 1933
1930s	1930s Great Depression	1910-1930 Jung, Adler, Horney and others refine psychoanalysis 1930s Henry Murray develops motivational personology 1930s Margaret Mead studies personality cross-culturally 1937 Gordon Allport proposes trait theory
1940s	1940s World War II and post-war boom	1940s Psychologist study fascism 1940s Existential philosophy takes root in U.S. 1940s Guilford, Cattell and others refine testing and factor analysis
1950s	1950s Growth of universities and the middle class	1950s Rogers, Maslow and Allport found humanistic psychology 1950s Cognitive revival begins in experimental psychology
1960s	1960s Civil right and sexual revolutions	1960s Interactionist (person by situation) approaches begin in earnest
1970s	1970s Women's rights movement 1970s divorces rise	1970s Multiple selves, self-monitoring, social self studied; classic theory fades 1970s Significant study of gender differences
1980s	1980s Corporate business revival 1970s International trade	1980s Personality and health studied; health Psychology established 1980s Modern interactionist model emerge 1980s Attention to cultural influences 1980s Studies of self from social/cognitive perspective
1990s	1990s Human genome is deciphered	1990s Five-Factor theory becomes a central topic 1990s Personal goals and life paths studied as theories become narrower 1990s Revival of interest in genetic and evolutionary bases of personality
2000s	2000s Economic boom ends 2000s world conflict increase	2000s Personality psychology booms, together with applied interests in health, ethnic conflict and culture 2000s Personality psychology increasingly rejoins with neuroscience, evolutionary biology and cognitive psychology

*Friedman, Howard S.; Schustack, Miriam W., Personality: classic theories and modern research, 3rd, ©2006. Reprinted by permission of Pearson Education, Inc., New York, New York. Appendix 2

1.2.2 Myers-Briggs Type Indicator®

Myers-Briggs Type Indicator® (MBTI®) was developed by Katharine Briggs and her daughter, Isabel Briggs Myer. The MBTI® is based on Carl Jung's theory of personality types. Jung's theory is based on the premise that people are different in the way they direct their energy, process information from the environment, make decisions and organise their lives. The MBTI® was developed around the time of the World Wars to allow people to better understand themselves and others. It has become popular among work environments due to its ease of understanding and high face-validity. It is a 100 question personality assessment (6). The MBTI® has four bipolar scales: introversion-extraversion, thinking-feeling, sensing-intuition and judgement-perception. From these scales 16 personality types can be distinguished (1, 7). A pitfall of the MBTI® is that there is no grading of personality characteristics e.g. a person is either introvert or extrovert (8).

1.2.3 "Type A" structured Interview

"Type A" structured interview was developed by two cardiologists, Friedman and Rosenman (9) in 1959. They showed that certain pattern of behaviour predisposes people to coronary artery disease. This type of testing falls into the realm of typology, a categorical scheme in which people meet the criteria or do not. Friedman and Rosenman (9) described three personality types for their study: "Type A" behaviour is characterised by "intense, sustained drive to achieve self-selected goals, competitiveness, desire for recognition and advancement, continuous involvement in activities with time restrictions, propensity to take on multiple physical and mental activities and mental and physical alertness"; "Type B" personality is the converse of "Type A", characterised by absence of drive, ambition, urgency and time constrained activities; "Type C" personality is similar to "Type B" but includes a chronic state of anxiety or insecurity. The authors selected unemployed blind men who had been blind for more than ten years for "Type C" group. The authors stated that the unemployed blind people exhibited little ambition, drive or desire to compete and lacked occupational deadlines. The authors believed that living with blindness created a chronic state of stress due to constant insecurity in the subjects' interaction with their environment.

By directed interview of a patient, it can be reported if the patient is “Type A” and is at higher risk for coronary artery disease (9).

1.2.4 Rorschach-type inkblot assessment

The Rorschach inkblot test was developed by Hermann Rorschach, a Swiss psychiatrist in 1921. Rorschach became interested in psychoanalysis in the 1910s. While working in a psychiatric hospital, he noticed children’s answers to a popular game Blotto (Klecksographie) were all different. The game involves creation poem like associations or charades from inkblots (10, 11). The Rorschach-Type inkblot test is a projective assessment. Projective assessments presume that unconscious motivational patterns reveal themselves under stimuli. Projective assessments are susceptible to examiner bias and are generally unreliable. However, projective tests can provide insight into a person’s personality (1). The Rorschach inkblots are vague, ambiguous stimuli. There is no correct answer. The person’s responses to what they see are noted by an examiner or self reported by the person being tested.

1.2.4 Cattell’s 16 personality factor questionnaire

Raymond Cattell was a British chemist, statistician and psychologist. In 1965, Cattell developed a personality assessment using factor analysis, a statistical technique, on the thousands of adjectives used to describe personality. This consolidated the information into factors or dimensions. A dimension is a group of variables that correlate with each other but not with other variables. Cattell verified his factor traits by gathering different data:

- Q-data - data gathered from self-reported sources e.g. questionnaires
- T-data - observational data e.g. objective, miniature situation test
- L-data - information gathered from a person’s life e.g. school reports.

Based on his analysis, he proposed that there are 16 basic personality traits. The traits were labelled by letters to emphasize their statistical origins (1).

The Handbook for the Cattell 16 Personality Factor (Cattell 16PF) states that the questionnaire “is a multidimensional set of sixteen questionnaire scales, arranged in omnibus form. It is designed to make available, in practicable testing time, information about an individual’s stand on the majority of primary personality

factors". It states that the Cattell 16PF is a comprehensive and functional measurement of personality based on personality sphere foundation (12).

1.2.5 Five-Factor Model

According to McCrae and John (13) "The Five-Factor Model (FFM) originated in studies of natural language trait terms". The reasons for basing the theory on language is that personality is descriptive and reported by laypersons. Therefore, a model should explain personality in the way that people understand it. The abundance of words which describe personality attests to its importance to people (13). Contemporary trait psychologists continue to utilise the FFM which is generally accepted to encompass the majority of traits (2). The FFM is the product of factor analysis of adjectives used to describe personality from various sources. It is a research driven rather than a theory-based model.

The five basic dimensions are: extraversion, agreeableness, conscientiousness, neuroticism and openness to experience. The FFM theorists claim these factors can be found in all personality instruments. The FFM is not an exhaustive description of personality, rather a hierarchical level of trait description. The FFM allows for integration of array of personality constructs. It is an efficient system which allows description of personality with only five scores (13).

1.2.5 Temperament Character Inventory

The Temperament Character Inventory is based on the psychobiological model of personality. It has many applications in assessment and treatment of mental disorders. Personality is the way people learn from experience and adapt their feelings, thoughts and actions (14). Personality is the dynamic organisation within an individual of the psychobiological systems that modulate adaptions to a changing environment (15). Personality traits are enduring patterns of perceiving, relating and thinking about oneself, other people and the world (14). Prior personality models were derived by factor analysis of behaviour. Psychobiological models link personality and subsequent behaviour to distinct anatomical functions of the brain such as memory pathways and neurotransmitters such as dopamine, serotonin and noradrenaline (15, 16).

In 1987, Cloninger (17) used the psychobiological model to define seven dimensions of personality. Cloninger et al. (15) describe the development of the TCI from a few models.

> The model was initially based on a synthesis of information from twin and family studies, studies of longitudinal development, neuropharmacologic and neurobehavioral studies of learning in humans and other animals, as well as psychometric studies of personality in individuals and in twin pairs. The original model described three dimensions of personality that were postulated to be genetically independent of one another.

These three elements did not encompass all the desired traits. The additional factors were included to create the seven factor model.

Second, in 1993 Cloninger et al. (15) sampled a group of 300 adults at a shopping centre in St. Louis, Missouri. The sample consisted of 150 men and 150 women, above the age of eighteen or older. The participants were given the TCI questionnaire. The testers were blinded to the personality assessment. The sample representativeness was compared to a national probability sample (15).

The TCI has now been used in many different populations and cultures: Swedish, French, Japanese, Dutch, German, Korean, Finnish and Chinese (18). It has shown good test-retest reliability and good validity when used in conjunction with other personality assessments (18).

Personality can be divided into temperament, character and psyche (19). The TCI tests temperament and character elements of personality. Factor analytic studies confirm that temperament and character are multidimensional. Each dimension is roughly normally distributed. Twin studies have allowed distinction of elements of personality on a genetic level (15). There is a distinction between the memory pathways for conceptual and perceptual memory. These pathways determine temperament and character (20).

Temperament involves percept-based habits and skills i.e. procedural memory and learning (21).Temperament is the automatic responses to emotional stimuli which

follow conditioning or procedural learning of habits and skills (14). Temperament has been shown to be: moderately heritable, stable form childhood through adulthood, consistent in different cultures and ethnic groups. Elements of temperament can be shown in nearly all vertebrates. The four TCI temperament dimensions are Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD) and Persistence (PS).

NS entails frequent exploratory activity in response to novelty, impulsive decisions, reward cues, loss of temper and avoidance of frustration. Individuals high in NS pursue potential reward or avoid monotony or potential punishment (17). NS traits are thought to reflect activity in the behavioural activation system of the brain. The behavioural activation centre is associated with the features of high NS individuals. Activity in this centre is associated with dopaminergic cell bodies in the midbrain which project to the forebrain. Activity is also associated with physiological arousal such as a rise in heart rate. Inputs to the dopaminergic pathways include reticular formation, hypothalamus and cerebral cortex via amygdala and caudate (17).

HA is the tendency to respond to aversive stimuli leading to inhibition of behaviour. This inhibition avoids punishment, novelty and frustrative non-reward. High HA is described as pessimistic worry, fears of uncertainty, shyness of strangers and fatigability (17). HA traits are thought to reflect activity of the behavioural inhibition system. This system consists of the raphe nuclei, frontal neocortex, ventral tegmental area and basal nucleus of Meynert (17).

RD is the continuation of behaviours that have previously been associated with reward or relief from punishment (15, 17). High RD individuals are described as tender-hearted, loving, warm, sensitive, dedicated, dependent and sociable. High RD individuals are sensitive to social ques. High RD can mean that a person is easily influenced by others (20).

PS is described as perseverance of behaviour despite frustration and fatigue, unrelated to RD. High PS tend to be industrious, hard-working and stable despite frustration and fatigue (20).

Character involves differences in concepts about one's self in functional relation to one's experience i.e. propositional memory and learning. Character requires abstract symbolic processes which have been shown to be part of the hippocampus and neocortex functioning. In the TCI, character consists of three dimensions: Self Directedness (SD), Cooperativeness (CO) and Self Transcendence (ST).

SD refers to the ability to control, regulate and adapt behaviour to fit a situation in accord with an individual's goals and values. SD can also be understood to be "willpower" in popular constructs. It is characterised by responsibility and resourcefulness in achieving personal goals. Personality disorders are likely to be present if self-directedness scores are low. SD corresponds to executive functions of personality and is a measure of frontal lobe function (21).

CO refers to individuals' ability to identify with and accept other people. It is a measure of agreeability or self-centred aggression. It corresponds to the judicial or evaluative elements. Individuals who score high in CO are described as socially tolerant, empathetic, helpful and compassionate. Individuals with high or moderate low scores in SD had an increased probability of a personality disorder if CO scores were also low (15, 21).

ST refers to spontaneous feelings of participation in the surroundings as a unitive whole. ST is often associated with 'spirituality'. The unitive perspective is described as acceptance, identification or spiritual union with nature. It corresponds to wise judgement, humble equanimity and selfless spirituality. Use of language to describe ST experience is difficult because it is intuitive rather than analytical. Individuals who score high for ST report periods of joyful unity and creative inspiration not attributed to self-directed analysis. EEG analysis shows activity of homologous cortical regions during episodes. The low ST is described as egocentric rational materialism (15, 21).

The Seven Dimensional model of personality encompasses the content of earlier models and has been shown to be useful in the study of the development of personality and its heritability (15, 21)

From the TCI dimensions, configurations are formed with both temperament and character. Configurations are related in a complex but systematic way which can then be used to describe different personalities and pathologies. These configurations can be applied to diagnosis and treatment of psychiatric conditions (14).

In 1999, the TCI was revised. TCI-R is the latest version. The TCI-R has a Likert scale format, instead of true-false questions (22). According to Farmer et al. (23) The TCI-R assesses the same domains as the TCI and includes refinements to PS scales. The short TCI is recommended for research purposes (22). The short TCI has also had many versions. The most current version is the TCI-140. The TCI-140 consists of 136 items related to the TCI-R and four response accuracy/carelessness items. The first 140 questions of the TCI-R constitute the TCI-140 (23).

There is criticism in the literature whether there is evidence to support the TCI's hypothesised structure of personality. Farmer et al. (23) state that factor analysis of the TCI reveals cross-loading of factors. Farmer et al. found that factors that are a mixture of temperament and character facets. This disputes the theory that temperament and character are distinct entities. Despite this argument, the TCI has been the basis for a multitude of research into personality and psychopathology (23).

1.3 Personality assessments among anaesthetist

1.3.1 Introduction

In 1977 Howat (24) described his prototype anaesthetist:

> The anaesthetist should be equally skilled as the surgeon in his field. There should be a foundation build on anaesthesia – despite anaesthetists having other interests such as intensive care or pain. The anaesthetist should recognise the responsibility of his duty to the patients while under anaesthesia. Although anaesthetists enjoy interaction with patients, a reason for being an anaesthetist is the periodic nature of the patient-doctor relationship. This leads to a conflict of interests where the anaesthetist wants to plan for the best treatment but is not the primary doctor. The anaesthetist

> is a sociable person, has good relations with colleagues and enjoys working in a team. Often the anaesthetist feels that they are the 'bridge' between different groups. For an anaesthetist, there is no place for arrogance.
>
> Anaesthetists tend to be rather paranoid. They can be acquiesce to surgeons for the sake of agreement between surgeon and anaesthetist to serve the patient, for any 'disharmony' in theatre puts the patient at risk (24).

Although some of Howat's characterisations may be accurate, researchers have moved away from anecdotal stereotypes and pursue more objective methods of describing personality.

1.3.2 Cattell 16PF

In 1980, Reeve (25) investigated the personality of anaesthetists in the United Kingdom (UK). In his discussion, Reeve criticises Freidson's (26) theory that professional behaviour is situational. Freidson(26) believed that medical professionals' behaviour will adapt to the social setting of their chosen field and hypothesises that if Freidson's theory is correct, then the selection of specialist candidates based on previous academic performance could predict success in a chosen program. However, this was not the case as evidenced by the "wastage/attrition rate" in the UK anaesthesiology program. Reeve suggested that the cause of the attrition rate of anaesthesiology trainees could be due to differences in personality and temperamental characteristics. Reeve's sample of anaesthetists in the UK represented 6.9% of UK anaesthetists. Reeve sent the Cattell 16PF – Form C Questionnaire to anaesthetists in the UK. The Form C is a shortened version of the 16PF questionnaire designed for research. Compared to general adults, anaesthetists were: less outgoing, brighter, more ascendant and dominant, more serious, more self-reproaching, unsure, more self-sufficient and more tense and frustrated. Among the subjects tested by Reeve, two syndromes which stood out as being different from the general population were described: one being "detachment, mental quickness, emotional stability, dominance, seriousness, cooperativeness, self-sufficiency and self-control"; the other syndrome showed "emotional instability, self-absorption, timidity and caution, irritableness, cunning,

sense of inadequacy, unsureness, lack of will power, tenseness and frustration." Reeve comments that it is crucial to test how these syndromes manifest as behaviour (25).

In 1983, Bruce et al. (27) performed various comparisons among a small sample of anaesthetists and psychiatrists in New York with the Cattell 16PF Form C. Trainee anaesthetists were more apprehensive, more adventurous, more intelligent, more innovative, more self-sufficient and less social than a general population sample. Consultant anaesthetists were more conscientious and less apprehensive than trainee anaesthetists. However, these scores were not far from the normal population scores. There were also significant differences between the anaesthetist and psychiatrist groups. Psychiatrist consultants were more outgoing, more tender-minded, less conscientious, less realistic and less conventional than the anaesthetist consultants. The authors suggest that from their results, these personality characteristics were not helpful in differentiating clinicians for recruitment purposes. The authors agree more closely with the hypothesis that the type of practice seems to shape the personality of the clinician.

In 1993 Reeve et al. (28) explored the use of psychological tests and semi-structured interviews to refine the selection of anaesthesia senior house officers in the UK. The study suggests that additional selection criteria would decrease "wastage" of resources due to candidates not completing the anaesthesiology program. The Cattell's 16PF Form C, an ability test and interviews were included in the selection process. An overall regression equation was created with personality factor scores and outcomes. The factor most heavily weighted was intelligence. Intelligence measure by the Cattell 16PF indicates preference for concrete or abstract thinking. Other important factors indicate that stable, imaginative and relaxed candidates performed better. A fault in the generated equation was that 12 candidates had intelligence scores in the top 1% of the general population but their academic and overall performance was only average. The researchers speculated that levels of anxiety, lack of confidence and tension could contribute to the poor performance. The equation had good validity when comparing male versus female candidates and minority groups. The researchers believed that their study demonstrated value of

personality assessment and interviews to the selection process for anaesthesiology trainees (28).

In 1994, Clarke et al (29) investigated the relationship between personality of anaesthetists and job satisfaction. A sample of anaesthetists from Alberta and Ontario provinces of Canada were sent the Cattell 16PF Form C. The overall assessment was that this group of anaesthetists were “intelligent, somewhat dominant yet sensitive, independent yet somewhat unsure and rather tense. They were also tolerant, shy and rather serious”. Women in this sample where more tender-minded, sensitive and overprotective than men. Women were less confident, more insecure and more apprehensive than men. Emotional stability and self-esteem were higher in older anaesthetists. Most anaesthetists were fairly satisfied with their job based on a visual analogue scale (mean 63.9 ± 20.8 for specialists and 57.9 ± 23.9 for non-specialists).

In 1999, Kluger et al. (30) described the personality profile of a sample of Australian anaesthetists by questionnaire. The questionnaire included only 16 questions from Cattell 16PF and eight additional questions. The questionnaire was completed by 167 anaesthetists who rated themselves as more controlled, stable, careful and confident than the general public. The researchers divided their sample according to “stability-instability” scores. This scale was chosen because it is a marker of a persons’ ability to cope with stress. The group above the median were classified as “stable”. The “stable” group scored significantly higher in all categories compared to “unstable” group. The “stable” group could be described as warm, tense, careful, confident, conscientious, independent, diligent, bright, persistent, controlled, perceptive, bold, tolerant, sensitive and vigilant. The “unstable” group profile was described as aloof, calm, casual, unsure, less conscientious, dependent, less diligent, dim, expedient, lax, less patient, less perceptive, shy, critical, tough and less vigilant. The Australian anaesthetists rated themselves as more sensitive and careful than Canadian anaesthetists.

1.3.3 Temperament Character Inventory

In 1999, Kluger et al. (31) described the personality traits of anaesthetists and physicians in Australia and New Zealand using the short-TCI (TCI-125). Three hundred and two doctors were mailed the TCI-125. The sample consisted of questionnaires from: 222 specialist anaesthetists, 75 trainee anaesthetists and 67 physicians. The sample was similar to the previously studied medical group in Norway by Cloninger et al (20). The medical groups had higher HA, higher SD, higher CO and lower ST compared to community sample from the TCI original study (20). The New Zealand sample had the lowest RD scores. The consultant physicians and consultant anaesthetists differed significantly only in CO. Trainee anaesthetists were significantly higher in NS and RD compared to specialist anaesthetist. The anaesthetist sample was split by the median age of 43, the younger anaesthetists were significantly higher in NS and RD. Female doctors in the whole sample were significantly higher in RD, PS and ST compared to males. On average, the description of a specialist anaesthetist is mature personality (high CO and SD) and also fitting 'obsessive-compulsive' type personality (low NS, high RD, low HA). Trainee anaesthetists mirrored the specialist group but had more moderate personality dimensions (31).

In 2002, Kluger et al. (32) studied the attitudes of consultant anaesthetists in New Zealand and Scotland towards the use of personality tests in the recruitment process of registrars for anaesthesiology. This study used a questionnaire with 14 visual analogue scales. The questions had anchors from eleven of the dimensions from the TCI. Respondents agreed that personality testing is a potentially useful adjuvant to identify good candidates for specialist training programs and excluding unsuitable ones. However, the respondents did not believe that personality influences reactions in stressful situations and personality does not correlate with clinical competence. The respondents rated independence and orderliness as important characteristics in both groups with differing opinions on compassion, empathy, reflectiveness and patience (32).

In 2003, Mitra et al. (33) compared anaesthesiologists to surgeons in an Indian study using the TCI-125. They found no significant differences between the two groups.

They note that they had a small sample size (n=93) and their sample may not be representative of the larger population.

1.3.4 Other assessments

In 1991, Gough and Bradley (34) investigated anaesthesiology resident performance related to personality and interests. The authors state that prior achievement, measured by results from Medical College Admission Test and medical school grades, can predict future academic performance. Clinical performance was not related to academic achievement but to personality characteristics. Ninety-five anaesthesiology residents at six training centres were assessed with the California Psychological Inventory (CPI) and the Strong Interest Inventory (SII). The researchers then compared CPI and SII to scores from departmental assessments. The scales that were related to academic performance were independence, empathy, socialisation, well-being and achievement via conformance. In an attempt to maximise predictive value the authors used complex statistical analysis. they chose scales that they felt were of the best predictive value. They also had to construct a cross-validation study group. The study reached the conclusion that "performance in an anesthesiology residency can be significantly, albeit modestly, predicted from a constellation of psychological attributes". (34)

In 1999, Reich et al. (35) investigated anaesthesiology residents' clinical performance between 1993 and 1995. Sixty-seven residents consented to participate. Residents were assessed using multiple scales including the CPI, State-Trait Anxiety Inventory, Vigil, Paced Auditory Serial Addition Test and residents' academic performance. Poor clinical outcome was predicted by high CPI score for introversion/extroversion, low CPI norm-favouring/norm-doubting and high CPI flexibility scale. Residents who were introverts with high flexibility had poor performance outcomes. Introverts are described by the CPI as shy, reserved, quiet and reluctant to engage in social activity. High flexibility is described by the CPI as "those who like change and variety, easily bored and impatient." These qualities are said to be "self-evident" by the author as why they are potentially poor qualities for an anaesthetist. The authors expected to find a correlation with anxiety but it was not significant.

In 2004, Mcmanus et al. (36) describe personality as part of a longitudinal study on stress, burnout and attitudes to work of doctors. A cohort had been identified in 1990 of people who were accepted to medical schools in the UK. They had been followed up in their final years at medical school and again at the end of their pre-registration house officer time. The participants were traced and sent questionnaires by mail including the General Health Questionnaire, Maslach Burnout Inventory, Study Process Questionnaire, an abbreviated questionnaire assessing the Big Five personality dimensions, Approach to Work Questionnaire and Workplace Climate Questionnaire. The researchers received 1 668 questionnaires out of 2 635 persons who they had identified as having completed basic medical science and entered a clinical course. With respect to the Big Five personalities, the researchers found several associations: Surface-disordered approach to work or the feeling of being overwhelmed at work, was associated with high neuroticism and low conscientiousness. Neuroticism was associated with a perceived high workload. Extraversion was associated with the deep approach to work and learning, meaning an integrative approach to learning that leads to personal understanding. High agreeableness was associated with a supportive-receptive work climate or the perception that help is available at work and colleagues are understanding. After multiple regression statistics were performed on the data, correlations between personality and other factors were identified: high neuroticism scores and introversion correlated with higher levels of stress and reports of emotional exhaustion. Low agreeableness scores correlated with high levels of depersonalisation. Extraversion correlated with greater sense of accomplishment. Low neuroticism correlated with satisfaction with medicine as a career. Low scores in neuroticism and high scores of extraversion are related to greater satisfaction with medicine as a career. The authors conclude that from the study that there is a causal link between personality and learning styles with approaches to work, workplace climate, stress, burnout and career satisfaction. (36)

In 2012, Schell et al. (37) compared MBTI® scores among 36 anaesthesiology residents and internal performance scores. The MBTI® measures 4 dichotomous scales, extravert / introvert, sensing / intuition, thinking / feeling and judging /

perceiving. Participants were assessed by senior staff via daily focal evaluation questions and global assessment of performance. Residents who were preferred "sensing" and "extrovert" tended to have better global assessment scores and daily performance scores. There was no difference in scores based on the evaluators' preference of personality (8-way ANOVA). Although not a large study, the authors comment that residents who are sensing and extroverts were perceived as better performers.

In 2009, Merlo and Matveevski (38) studied anaesthesiology residents in Florida, USA. The authors comment that the United States of America residency matching system is complex. The matching system does not include personality assessment. They selected a small group of "high competency" and "low competency" residents based on internal competency ratings. Residents were given a battery of tests to assess fine motor skill, executive functioning, processing speed, attention and personality. The International Personality Item Pool – Neuroticism, Extraversion and Openness questionnaire (IPIP-NEO) was used to assess personality. The IPIP-NEO is based on the FFM and it is a 300-item self-reported questionnaire. Neuropsychological tests showed no significant differences between residents. However, there were differences in personality between the two groups of residents. The "high competency" group were significantly higher on co-operation, self-efficacy and adventurousness. The "high competency" residents scored lower in neuroticism, anxiety, anger and vulnerability. The "high competency" residents scores indicate that they have a low likelihood to intimidate others, high compliance (high co-operation scores), confidence in their ability, eagerness to try new things, less emotional reactivity, less tense, less likely to become upset during an altercation and less likely to become panicked or confused under pressure. The authors agreed that personality characteristics can aid prediction of success in clinical programs (38).

In 2015, van der Wal et al. (39) sent electronic surveys to resident and consultant Dutch anaesthetists to assess psychological distress, burnout and personality traits. They used the General Health Questionnaire to assess psychological distress; burnout was assessed with the Maslach Burnout Inventory - the Utrechtse Burnout Schaal and personality was assessed with the Big Five Inventory questionnaire. Six

hundred and fifty-five questionnaires were returned. Neuroticism was associated with the presence of psychological distress and burnout.

1.4 Summary

The effect of personality on the practice of anaesthesiology is extensive. The impact of personality on speciality choice, academic performance, stress, burnout, substance abuse, suicidal tendency has been well documented. The evolution of personality psychology has generated many assessments. The variety of personality assessments that are utilised makes comparison between studies difficult. However, there is a trend in the literature to describe a mature, intelligent, cooperative, self-directed, extroverted person as having greater success in anaesthesiology.

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Section 2: Journal guidelines to author

This section contains the guidelines which the author has followed with regards to the length and formatting of the research article.

The guideline followed in creation the draft article was from of the Southern African Journal of Anaesthesia and Analgesia.

Therefore, the style of the draft article is different to remainder of the document which is according to the University of Witwatersrand style guide.

2.1 Southern African Journal of Anaesthesia and Analgesia guidelines to authors

Aims, scope and review policy

The SA Journal of Anaesthesia and Analgesia aims to publish original research and review articles of relevance and interest to the anaesthetist in academia, public sector and private practice. Papers are peer reviewed to ensure that the contents are understandable, valid, important, interesting and enjoyed. All manuscripts must be submitted online.

SAJAA is accredited by the Department of Education for the measurement of research output of public higher institutions of South Africa (SAPSE accredited). All articles in SAJAA will be peer reviewed.

Article sections and length

The following contributions are accepted (word counts exclude abstracts, tables and references):

* Original research (2800 – 3200 words/ 4-5pages)

* Clinical Reviews (2400 words/ 3-4 pages)

* Drug Reviews (2400 words/ 3-4 pages)

* Case Studies (1800 words/ 3 pages)

* Scientific Letters (2400 words/ 3-4 pages)

* Letters to the Editor (400-800 words)

Please see the journal's section policies section policies for further details.

Full author guidelines

Title page

All articles must have a title page with the following information and in this particular order:

Title of the article; surname, initials, qualifications and affiliation of each author;

The name, postal address, email address and telephonic contact details of the corresponding author and at least 5 keywords.

Abstract

All articles should include an abstract. The structured abstract for an Original Research article should be between 200 and 230 words and should consist of four paragraphs labelled: Background, Methods, Results, and Conclusions. It should briefly describe the problem or issue being addressed in the study, how the study was performed, the major results, and what the authors conclude from these results. The abstracts for other types of articles should be no longer than 230 words and need not follow the structured abstract format.

Keywords

All articles should include keywords. Up to five words or short phrases should be used. Use terms from the Medical Subject Headings (MeSH) of Index Medicus when available and appropriate. Key words are used to index the article and may be published with the abstract.

Acknowledgements

In a separate section, acknowledge any financial support received or possible conflict of interest. This section may also be used to acknowledge substantial contributions to the research or preparation of the manuscript made by persons other than the authors.

References

Cite references in numerical order in the text, in superscript format (Format> Font>Click superscript). Please do not use brackets or do not use the foot note function of MS Word. In the References section, references must be typed double-spaced and numbered consecutively in the order in which they are cited, not alphabetically.

The style for references should follow the format set forth in the Uniform Requirements for Manuscripts Submitted to Biomedical Journals

(http://www.icmje.org) prepared by the International Committee of Medical Journal Editors. Abbreviations for journal titles should follow Index Medicus format. Authors are responsible for the accuracy of all references. Personal communications and unpublished data should not be referenced. If essential, such material should be incorporated in the appropriate place in the text. List all authors when there are six or fewer; when there are seven or more, list the first three, then ";et al."; When citing URLs to web documents, place in the reference list, and use the following format: Authors of document (if available). Title of document (if available). URL. (Accessed [date]).

The following are sample references:

1. Jun BC, Song SW, Park CS, Lee DH, Cho KJ, Cho JH. The analysis of maxillary sinus aeration according to aging process: volume assessment by 3dimensional reconstruction by high-resolutional CT scanning. Otolaryngol Head Neck Surg. 2005 Mar;132(3):42934.2.

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More sample references can be found at: http://www.nlm.nih.gov/bsd/uniform_requirements.html"

Tables

Tables should be self-explanatory, clearly organised, and supplemental to the text of the manuscript. Each table should include a clear descriptive title on top and numbered in Roman numerals (I, II, etc.) in order of its appearance as called out in text. Tables must be inserted in the correct position in the text. Authors should place explanatory matter in footnotes, not in the heading. Explain in footnotes all nonstandard abbreviations.

For footnotes use the following symbols, in sequence: *,†,‡,§,||,**,††,‡‡

Figures

All figures must be inserted in the appropriate position of the electronic document. Symbols, lettering, and numbering (in Arabic numerals e.g. 1, 2, etc. in order of appearance in the text) should be placed below the figure, clear and large enough to remain legible after the figure has been reduced. Figures must have clear descriptive titles.

Photographs and images

If photographs of patients are used, either the subject should not be identifiable or use of the picture should be authorised by an enclosed written permission from the subject. The position of photographs and images should be clearly indicated in the text. Electronic images should be saved as either jpeg or gif files. All photographs should be scanned at a high resolution (300dpi, print optimised). Please number the images appropriately.

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Permission should be obtained from the author and publisher for the use of quotes, illustrations, tables, and other materials taken from previously published works, which are not in the public domain. The author is responsible for the payment of any copyright fee(s) if these have not been waived. The letters of permission should accompany the manuscript. The original source(s) should be mentioned in the figure legend or as a footnote to a table.

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Manuscripts are initially examined by the editorial staff and are usually sent to independent reviewers who are not informed of the identity of the author(s). When publication in its original form is not recommended, the reviewers' comments (without the identity of the reviewer being disclosed) may be passed to the first author and may include suggested revisions. Manuscripts not approved for publication will not be returned.

Ethical considerations

Papers based on original research must adhere to the Declaration of Helsinki on "Ethical Principles for Medical Research Involving Human Subjects"; and must specify from which recognised ethics committee approval for the research was obtained.

Conflict of interest

Authors must declare all financial contributions to their work or other forms of conflict of interest, which may prevent them from executing and publishing unbiased research. [Conflict of interest exists when an author (or the author's institution), has financial or personal relationships with other persons or organizations that inappropriately influence (bias) his or her opinions or actions.] * *Modified from: Davidoff F, et al. Sponsorship, Authorship, and Accountability. (Editorial) JAMA 2001: 286(10) The following declaration may be used if appropriate: ";I declare that I have no financial or personal relationship(s) which may have inappropriately influenced me in writing this paper."

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All submissions must be made online at www.sajaa.co.za and correspondence regarding manuscripts should be addressed to:

The Editor, SAJAA, Email: toc@sajaa.co.za

Note: Ensure that the article ID [reference] number is included in the subject of your email correspondence.

Electronic submissions by post or via email

Authors with no email or internet connection can mail their submissions on a CD to:

SAJAA, PO Box 14804, Lyttelton Manor, 0140, Gauteng, South Africa.

All manuscripts will be processed online. Submissions by post or by email must be accompanied by a signed copy of the following indemnity and copyright form.

Tips on Preparing your manuscript

1. Please consult the “Uniform requirements for manuscripts submitted to biomedical journals” at www.icmje.org

2. Please consult the guide on Vancouver referencing methods at: http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=citmed.TOC&depth=2

3. The submission must be in UK English, typed in Microsoft Word or RTF with no double spaces after the full stops, double paragraph spacing, font size 10 and font type: Times New Roman.

4. All author details (Full names, Qualifications and affiliation) must be provided.

5. The full contact details of corresponding author (Tel, fax, email, postal address) must be on the manuscript.

6. There must be an abstract and keywords.

7. References must strictly be in Vancouver format. (Reference numbers must be strictly numerical and be typed in superscript, not be in brackets and must be placed AFTER the full stop or comma.)

8. It must be clear where every figure and table should be placed in the text. If possible, tables and figures must be placed in the text where appropriate. If too large or impractical, they may be featured at the end of the manuscript or uploaded as separate supplementary files.

9. All photographs must be at 300dpi and clearly marked according to the figure numbers in the text. (Figure 1, Table II, etc.)

10. All numbers below ten, without percentages or units, must be written in words.

11. Figure numbers: Arabic, table numbers: Roman <="" uk="" in="" proficient="" expert="" a="" by="" reviewed="" be="" must="">

Section 3: Draft article

Personality profile of anaesthetists in a department of anaesthesiology

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Keywords:

Anesthesia, anaesthetist, personality, psychological responses, Temperament Character Inventory

Abstract

Background: Personality assessment has potential implications in anaesthesiology for recruitment into specialist programs, performance outcomes and identifying risk for burnout or psychological distress. The personality traits of anaesthetists can predispose them to occupational stress and burnout. Moreover, anaesthesiology is an inherently stressful workplace. Different researchers have found personality types to be prominent in subsets of doctors. The aim of this study was to describe the personality profile of the anaesthetists working in a department of anaesthesiology. Secondary outcomes were to identify differences between: male and female anaesthetists, age groups and levels of experience.

Methods: A descriptive, prospective, contextual study design was used. The Short Temperament-Character Inventory (TCI-140) questionnaire was used to describe the personality profile of anaesthetists using the 7 dimensions and configural analysis.

Results: Anaesthetists in the sample had low *Novelty Seeking* (median 25%), average *Harm Avoidance* (median 37%), average *Reward Dependence* (median 47%), high *Persistence* (median 70%), high *Self Directness* (median 87%), high *Cooperativeness* (median 73%) and average *Self Transcendence* (median 34%). Forty participants were classified as extreme temperament personality types. One participant was an immature personality type.

Conclusions: The effect of personality on the practice of anaesthesiology is extensive. Male anaesthetists scored as low *Harm Avoidance* compared to average for female anaesthetists. There was no significant difference between anaesthetists of different ages. Senior anaesthetists scored low for *Harm Avoidance* and *Self Transcendence* compared to average for junior anaesthetists for those dimensions. The personality profile of anaesthetists in this sample is similar to other studies and reflects qualities required for the practice of anaesthesiology.

Introduction

The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) defines personality as "Enduring patterns of perceiving, relating to, and thinking about the environment and oneself" and defines personality traits as "prominent aspects of personality that are exhibited in relatively consistent ways across time and across situations. Personality traits influence self and interpersonal functioning".[1] Personality is all the attributes of a human being that distinguishes it from a predictable machine or the human beings adapt to their internal and external environment.[2] Researchers have tried to link personality traits with medical speciality choice,[3-6] selection of candidates for specialist training,[7, 8] performance of doctors in specialist programs [9] and levels of stress and burnout in doctors.[10] The presence of a personality disorder may be due to impairments in personality functioning and personality trait expression.[11] Distinctive personality types have been found to be more prominent in subsets of doctors using different assessment tools.[7, 12-14]

Personality assessments attempt to define and measure important characteristics and to explore the consequences of identified traits. As the study of personality has evolved, a variety of personality assessment tools have developed incorporating new findings.[15] This makes comparison between studies that used different assessment tools more complex. Personality is distinguished into three separate domains: temperament, character and psyche.[2] Temperament involves individual differences in percept-based habits and skills; character involves differences in concepts about one's self in functional relation to parts of the whole field of experience, psyche is a persons' level of intuitive self-awareness.[2] Temperament and character can be assessed separately and they have different clinical application.[16]

Studies have been carried out with the aim of identifying associations between personality characteristics and performance in anaesthesiology training programs.[8, 17-19] Reeve[7] in 1980 conducted a study to identify the personality traits of anaesthetists and refuted the belief that after basic medical education a doctor could complete any speciality training. The author stated a variable number of doctors in the United Kingdom are unable complete anaesthesia specialist training and postulated that personality and temperamental characteristics may contribute to performance in specialist training. Markus et al.[20] comment that many markers of academic performance are used to measure aptitude and that the current interview process may not predict performance of a potential resident.[20]

Merlo and Matveevski[9] noted that personality has an impact on academic performance. They found differences in their study comparing competency of anaesthesiology residents and personality, that were differences in performance based on residents' personality as assessed using the International Personality Item Pool Representation of the NEO PI-R (based on the Five Factor Model of personality). In their study, high competency residents scored higher for attributes such as cooperation, self-efficacy, achievement-striving, cautiousness and conscientiousness. Low competency residents scored higher for neuroticism, anxiety, anger and vulnerability. These authors hypothesise that attributes of the high competency residents will aid them in success in an anaesthesiology program.[9] Schell et al.[21] also assessed the relationship between personality of anaesthesiology residents and academic performance. They profiled anaesthesiology residents using the Myer Briggs Type Indicator ® (MBTI®). The researchers found those residents who had scored high in "extroversion" and "sensing" correlated with better scores in Global Assessment of Performance and daily performance scores by senior staff within their department. However, in standardised tests, there was no significant association between performance of residents and their personality types.[21]

In addition, personality has been associated with occupational stress.[10, 22-24] Occupational stress is a "negatively perceived quality, which, as a result of inadequate coping with sources of stress, has negative mental and physical ill health consequences".[25] Medical professionals are described as obsessive, perfectionist and having a high drive for achievement, which may predispose them to occupational stress.[22] Anaesthesia as a profession is inherently stressful as there is always the potential for severe damage to or death of patients.[23] Suicide rates have been linked to high stress levels in a profession. Studies suggest that there is a higher suicide rate among doctors.[25, 26] Anaesthetists are quoted as having a higher risk of suicide than the general population. This would indicate that doctors, especially anaesthetists, are working with higher levels of stress than the general population.[24, 27]

Burnout is a syndrome due to chronic exposure to stress. Burnout consists of three dimensions: exhaustion, distancing or depersonalisation and reduced personal accomplishment.[28] Van der Wal et al.[10] found that Dutch anaesthetists who scored high for "neuroticism" as assessed by the Big Five Inventory also had a higher prevalence of burnout and psychological distress as measured on the Maslash Burnout Inventory-Human Services Survey (MBI-HSS). A neurotic person is described by the Big Five Inventory as "nervous, anxious, moody and hostile".[10] In a South African study, Van der Walt

et al.[29] found a high level of burnout among anaesthetists using MBI-HSS at the University of the Witwatersrand and among private South African anaesthetists.[29]

It is evident that personality is a component of a doctor's ability to complete and cope within a speciality program. The personality traits of anaesthetists can predispose them to occupational stress and burnout. In order to add to the knowledge about local groups of anaesthetists, the primary outcome of this study was to describe the personality profile of the anaesthetists working in a department of anaesthesiology according to the 7 Temperament Character Inventory (TCI) dimensions and configural analysis. Secondary outcomes were to identify differences between male and female anaesthetists, different age groups and levels of experience.

Methods

A descriptive, prospective, contextual study design was followed. The TCI-140 is a self administered personality questionnaire and it was procured from the Center of Well-Being at the University of Washington, St. Louis.[30] Ethics clearance was obtained from the Human Research Ethics Committee (Medical) and other relevant authorities.

The TCI is based on the neurobiology seven-factor model of temperament and character. This personality model includes seven dimensions: *Novelty seeking, Harm avoidance, Reward dependence, Persistence, Self Directness, Cooperativeness* and *Self Transcendence*. The TCI dimensions corresponds to predictable emotional responses to different stimuli and moods of a person. A profile derived from the TCI provides a quantitative rating of an individual's personality. The TCI can facilitate diagnosis of personality disorders and can be used to monitor response to treatment.[31] Descriptors for the seven dimensions are shown in Table I.

The Short TCI is an abbreviated version of the full TCI questionnaire. The TCI-140 is the latest version of the Short TCI. The Short TCI is recommended for research where time availability is limited.[32] The TCI-140 has been shown to correlate highly with the full TCI as the seven dimensions assess similar constructs in both tests.[33] Other studies have used older versions such as the TCI-125.

Table I**:** Temperament and character descriptors*

Personality Dimension	**High Score**	**Low Score**
Temperament		
Harm Avoidance	worrying and pessimistic fearful and doubtful shy fatigable	relaxed and optimistic bold and confident outgoing vigorous
Novelty Seeking	exploratory and curious impulsive extravagant and enthusiastic disorderly	indifferent reflective frugal and detached orderly and regimented
Reward Dependence	sentimental and warm dedicated and attached dependent	practical and cold withdrawn and detached independent
Persistence	industrious and diligent hard working ambitious and overachiever perseverant and perfectionist	inactive and indolent gives up easily modest and underachiever quitting and pragmatist
Character		
Self Directness	mature and strong responsible and reliable purposeful resourceful and effective self accepted habits congruent with long term goals	immature and fragile blaming and unreliable purposeless inert and ineffective self striving habits incongruent with long term goals
Cooperativeness	socially tolerant empathic helpful compassionate and constructive ethical and principled	socially intolerant critical unhelpful revengeful and destructive opportunistic
Self Transcendence	creative and self forgetful united with universe	impatient unimaginative and self conscious pride and lack of humility

*Permission from the Center of Well-Being – TCI Guide[30]

This anaesthesiology department at the time of this study, consisted of 218 anaesthetists. The number of questionnaires that could be analysed was limited due to financial constraints. Inclusion criteria were anaesthetists working in the department of anaesthesiology. Intern doctors who are undergoing training in the department were excluded from the study. Participation was voluntary and completion of the questionnaire implied consent. Questionnaires were anonymous. A demographic page was included with the questionnaires. A convenient sample was taken from anaesthetists at academic meetings from January to May 2016. Incomplete questionnaires were then excluded from analysis. Raw scores from 101 questionnaires were analysed by the Center of Well-Being. Percentile scores for the seven

dimensions were provided by the Center of Well -Being and were analysed with Stata® 13.1 with the assistance of a biostatistician. Percentile scores were not normally distributed and were analysed with Mann-Whitney tests. A significant difference was considered if the p-value was less than 0.05.

Interpretation of TCI scores is compared to a community sample of 300 normal adults and scores are represented as percentiles.[34] For interpretation of results, the percentile scores are classified as low (0-33%), average (34-66%) and high (67-100%). Individuals who are high or low in a dimension will exhibit typical patterns of behaviour, whereas average individuals are often inconsistent. A description can be formulated corresponding to the seven dimensions or a configural analysis. Configural analysis examines more than one dimension concurrently.[30] A configural analysis applied to *Novelty Seeking, Harm Avoidance* and *Reward Dependence* produces eight extreme temperament personality types. According to the TCI guide[30] the incidence of these extreme personality types is approximately 3.7% of the population. Extreme temperament types are not equated to the severity of a personality disorder. Temperament types determine a style or pattern of behaviour and the character dimensions must also be considered. The presence of a personality disorder is more likely if the person is also "immature", as shown by low character scores for *Self Directness* and *Cooperativeness.*[30] All other configurations are classified as "mild".[30] Individuals who score as average on *Novelty Seeking, Harm Avoidance* and *Reward Dependence* are classified as "average" or "flexible" which occurs in 3.7% of the population.[30]

For ease of understanding, explanation of personality dimensions will be included with some results.

Results

A total of 109 questionnaires were handed out. One hundred and one questionnaires were analysed by the Center of Well-Being. Two questionnaires were incomplete and unsuitable to be analysed. Six questionnaires were not returned. Demographic data are presented in Table II.

Table II: Demographic data

	n=101	
Sex		
Male	26	25.7%
Female	75	74.3%
Age Ranges		
20-30	26	25.7%
31-40	64	63.4%
41-50	5	4.9%
51-60	5	4.9%
>60	1	0.9%
Level of training		
Medical officer	15	14.9%
Registrar	49	48.5%
Career medical officer	2	1.9%
Consultant	35	34.7%

The following is a description of the personality dimensions for the total sample as represented in Table III: Low *Novelty Seeking* (median 25%), average *Harm Avoidance* (median 37%), average *Reward Dependence* (median 47%), high *Persistence* (median 70%), high *Self Directness* (median 87%), high *Cooperativeness* (median 73%) and average *Self Transcendence* (median 34%).

The description of the dimensions are as follows: low *Novelty Seeking* are "slow tempered, indifferent, uninquiring, unenthusiastic, stoical, reflective, frugal, reserved, tolerant of monotony, systematic and orderly"; High *Self Directness* is described as "mature, strong, self-sufficient, responsible, reliable, goal oriented, constructive and well-integrated individuals; they have good self-esteem and self-reliance. They are effective and can adapt their behaviour in accordance with their chosen goals". They are responsible, purposeful, self accepting and disciplined[31]; people who score high in *Self Directness* may be perceived as rebellious by others in authority positions because they challenge goals and values; High *Persistence* is described as "industrious, hard-working, persistent and stable despite frustration and fatigue"[30]; *Cooperativeness* is a measure of ability to identify with and accept other people and high *Cooperativeness* is described as "empathetic, tolerant, compassionate, supportive, fair and principled individuals". High *Cooperativeness* is important in teamwork and social groups[30]; low *Novelty Seeking* and average *Harm Avoidance* can be described as reflective, rigid and loyal. A person low in *Novelty Seeking* and *Harm Avoidance* is often cheerful, overconfident and boastful regardless of the situation. They are less likely to be anxious, depressed and difficult to anger[30]; Cloninger and

Svrakic [31] describe individuals with low *Novelty Seeking* and low *Reward Dependence* as deliberate or methodical. The scores for *Reward Dependence* and *Self Transcendence* were average meaning that the responses by persons in these dimensions would be inconsistent.

The sex differences in the sample showed a significant difference in *Harm Avoidance* ($p = 0.0004$). Females scored as average (median 47%) and the males scored as low (median 17.5%). Individuals low in *Harm Avoidance* are "carefree, relaxed, daring, courageous, composed and optimistic even in situations that worry most people".[30] For *Self Transcendence* the difference was not statistically significant ($p = 0.093$). However, male median score was low (median 27.5%) and female average (median 37%). Low scores for *Self Transcendence* are described as "proud, impatient, unimaginative, unappreciative of art, self-aware, materialistic and unfulfilled. They cannot tolerate ambiguity, uncertainty and surprises".[30]

The sample was divided by age into less than 40 years old and more than forty-one year old anaesthetists. The difference for *Harm Avoidance* and *Self Transcendence* were not significant. However, the younger anaesthetists' score for *Harm Avoidance* was average (median 40.5%) and the older group's was low (median 25%). For *Self Transcendence*, the younger group's score was average (median 34%) and the older group's low (median 27%). According to the TCI guide,[30] low *Harm Avoidance* are described as outgoing, bold and high energy; they are confident in the face of danger and uncertainty; however, they can sometimes have unrealistic optimism; low *Self Transcendence* "do not tolerate ambiguity, uncertainty and surprises; they strive for control"; they can appear pretentious; they are rational, scientific and objective.

The sample was divided by level of experience: senior anaesthetists were classified as consultants and career medical officers; junior anaesthetists were classified as medical officers and registrars. The differences were not statistically significant. For *Harm Avoidance* ($p = 0.81$), senior anaesthetists scored low (median 32%) and juniors scored average (median 43.5%). For *Self Transcendence* ($p = 0.57$), senior anaesthetists were low (median 32%) and juniors were average (median 37%).

Table III: Median percentile scores and interquartile range (IQR) for total group, sex, age and level of training according to TCI Dimensions

Dimension	Total	n=101	Female	n=75	Male	n=26	p-value	Age ≤ 40	n=90	Age > 41	n=11	p-value	Junior	n=64	Senior	n=37	p-value
	Median	IQR	Median	IQR	Median	IQR		Median	IQR	Median	IQR		Median	IQR	Median	IQR	
NS	25	37	25	24	27.5	25	0.72	25	23	19	35	0.56	25	29.5	23	19	0.86
HA	37	61	47	45	17.5	32	0.004	40.5	47	25	51	0.5	43.5	41	32	51	0.81
RD	47	77	53	62	42	38	0.41	47	58	47	29	0.66	45	59	47	49	0.82
PS	70	87	70	31	77	44	0.45	70	34	70	64	0.67	70	28	70	40	0.99
SD	87	93	87	25	88	17	0.36	87	23	87	34	0.92	87	25	82	16	0.98
CO	73	87	73	42	62.5	51	0.4	73	42	70	34	0.71	71.5	43	73	40	0.96
ST	34	63	37	54	27.5	40	0.09	34	54	27	36	0.41	37	59.5	32	47	0.57

A configural analysis applied to the sample produced the following results show in Table IV: forty participants (39.6%) were classified as an extreme temperament personality types and 1 participant (0.9%) as "immature". Three participants (2.9%) were found to be "flexible". The eight extreme temperament personality types are shown in Table IV.

Table IV: Configural personality assessment†

Personality Type	Dimension							
Temperament	NS	HA	RD	Total	MO	Reg	CMO	Con
Antisocial	High	Low	Low	1		1		
Histrionic	High	Low	High	2		1		1
Passive aggressive	High	High	High	0				
Explosive / Borderline	High	High	Low	0				
Obsessional	Low	High	Low	5		2		3
Schizoid	Low	Low	Low	15		9		6
Cyclothymic	Low	Low	High	10	1	4		5
Passive dependent	Low	High	High	7	2	3		2
			Total	40				
Flexible	Ave	Ave	Ave	3		2		1
Character	SD	CO						
Immature	low	low		1		1		

†NS – Novelty Seeking, HA – Harm Avoidance, RD – Reward Dependence, SD – Self Directness, CO – Cooperativeness.

These classic descriptions of personality disorders have failed to provide clinicians with effective methods of assessment and care. The rigid categorical system produces stigma and they are not a useful prescription for positive personality development.[2] The categorical labels only remind a clinician of expected interaction patterns.[30]

Discussion

Personality has an important role in specialty choice, perceptions of stress and job satisfaction.[35, 36] With respect to anaesthesia, personality typing has been included in research with various objectives such as recruitment, academic performance and error avoidance.[3, 8, 9, 19, 21, 35, 37] Anaesthetists have been found to have a distinct pattern of personality compared to other specialist doctors and the general public.[7, 13, 14]

Anaesthetists in the sample had low *Novelty Seeking* (median 25%), average *Harm Avoidance* (median 37%), average *Reward Dependence* (median 47%), high *Persistence* (median 70%), high *Self Directness* (median 87%), high *Cooperativeness* (median 73%) and average *Self Transcendence* (median 34%).

Reeve[7] in 1980 studied the personality of anaesthetists in the United Kingdom using the Cattell 16 personality factor (16PF) questionnaire Form C. The description of the total sample of anaesthetists is "less outgoing, brighter, more ascendant and dominant, more serious, more self-reproaching, unsure, more self-sufficient and more tense and frustrated". Reeve[7] described his ideal anaesthetist as a person who can deal with the task of anaesthesia specifically long periods of vigilance and appropriate response to crises. This prototype is independent, makes their own decisions and sets high standards to be achieved. Calm reactions are preferable to carelessness and emotional instability which could jeopardise a patient's life during surgery.[7]

Reeve et al.[8] used the Cattell 16PF in 1993 to describe relationship between personality and performance. The investigators used regression equations to describe the relationship between dimensions of the 16PF and performance of anaesthetic trainees. Trainees who performed better were more "practical and realistic, more self-disciplined, more dependable and less subjective".[8]

Reich et al.[37] in 1999 described the relationship between personality and academic measures in anaesthesiology residents in New York, USA. Sixty-seven residents participated in the study over three years. Personality was assessed using the California Personality Inventory (CPI) that consists of 23 scales. Poor performance was associated with introversion and high flexibility. Introversion is described, according to the CPI, as "reticent, shy, reserved and reluctant to initiate or take decisive social action." High flexibility is described as "those who like change and variety, are easily bored by routine and may be impatient and erratic".[37]

Merlo and Matveevskii[9] in 2009 investigated personality tests and anaesthesiology outcomes in 26 anaesthesiology residents in Florida, USA. The investigators used the International Personality Item Pool Representation of the NEO PI-R (IPIP-NEO) that assesses the Big Five Inventory. High competency residents scored higher on co-operation (compliance and low likelihood of intimidating others), self-efficacy (ability to complete tasks) and adventurousness (eagerness to try new things). High competency residents also scored lower for neuroticism, anxiety, anger and vulnerability.[9] Merlo and Matveevskii[9] state that these personality traits were found in residents who were likely to succeed in their training and warn that personality should not be looked at in isolation.

Kluger et al.[14] in 1999 used the TCI-125 to describe and compare specialist anaesthetists, trainee anaesthetists and specialist physicians in New Zealand. The average specialist anaesthetist was low *Novelty Seeking*, low *Harm Avoidance*, high *Reward Dependence*. Extreme personality types with immature character were found in 9% of specialist anaesthetist and 9.6% of trainee anaesthetists. Kluger et al. found 39.6% of participants in the

sample were classified as one of the extreme temperament personality types. Only one participant in this study was an "immature" personality which would increase the suspicion of pathological personality type. Kluger et al.[14] comment that these personality traits fall into the stereotypical anaesthetist: a medical profession which requires limited patient contact; a stressful working environment with potential for serious complications and constant expectation to perform without adverse outcomes; some personalities traits are promoted by the practice of anaesthesia such as unassertiveness and cynicism where it is believed that surgeons are in control of the theatre environment at all times.

Anaesthetists from this sample showed a similar pattern to the New Zealand sample from 1999. The anaesthetists in this sample scored more "average" on personality dimensions compared to the New Zealand study. Both groups have low *Novelty Seeking*, high *Self Directness* and high *Persistence*. The difference between sub-groups was less pronounced within this sample compared to the New Zealand group.[14]

There was a significant difference in *Harm Avoidance* between male and female anaesthetists in this sample: Males scored as low and females as average. The difference in *Self Transcendence* was that males scored low and females average but this was not statistically significant. In the community sample done by Cloninger et al.[34] females had higher scores for *Cooperativeness*. Kluger et al.[14] found female anaesthetists scored higher in *Persistence*, *Reward Dependence* and *Self Transcendence* than male anaesthetists.

In this sample, anaesthetists more than 41 years old scored low for *Harm Avoidance* and *Self Transcendence* and younger than 40 years scored average for *Harm Avoidance* and *Self Transcendence*. Neither difference was statistically significant. In the community sample by Cloninger et al.,[34] *Cooperativeness* and *Self Directness* increase with age until the fourth decade and then remain stable. Kluger et al.[14] found anaesthetists over 43 years old had higher scores for *Novelty Seeking* and *Reward Dependence* compared to younger anaesthetists.

This sample was divided by level of experience, senior anaesthetists scored low for *Harm Avoidance* and *Self Transcendence*. Junior anaesthetists scored as average for *Harm Avoidance* and *Self Transcendence*. Kluger et al.[14] in 1999 compared specialist and trainee anaesthetists. Trainee anaesthetists had higher *Novelty Seeking* and *Reward Dependence* scores.

The description of anaesthetists has been formulated from diverse communities using different assessment tools.[3, 7, 13, 17] The trend from the various authors is that the personality traits all imbue attributes that are advantageous to practice of anaesthesiology. Bruce et al.[4] comment on whether it is appropriate to use

psychometric assessments to select doctors for training programs. The use of personality assessment in recruitment for non-medical fields is wide spread.[38] Kluger et al.[39] in 2002 surveyed 523 anaesthetists in New Zealand and Scotland. Anaesthetists in the study agreed that personality testing is a potentially useful adjuvant to identify good candidates for specialist training programs and excluding unsuitable ones. However, the respondents belief was that personality does not influence reactions in stressful situations and does not correlate with clinical competence.[39] Mitra et al.[40] in 2003 investigated the TCI-125 in anaesthesiologists and surgeons in India and found no significant differences between the two groups.

The results of this study should be interpreted with the following limitations: This study was conducted in a department of anaesthesiology and may not be representative of the wider anaesthesia community. The sample size of the study was limited due to financial constraints and may be under powered to detect differences between subgroups. The Short-TCI does not have the same depth of description of personality as the full TCI but is validated for research purposes. The TCI has been criticised for not adequately explaining its biological underpinnings.[33, 41] The TCI was chosen as the instrument in this study because it has been shown to be valid across cultures, languages and psychiatric pathology.[33]

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Conflict of interests

The authors declare that there are no financial or personal relationship which may have inappropriately influenced the writing this paper.

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Section 4: Appendices

Appendix 1: Postgraduate Approval

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

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

09 December 2015
Person No: 0208675W
PAG

Dr C Segal
Interlaken Flat 402
Killarney 38
8th Street
2193
South Africa

Dear Dr Segal

Master of Medicine: Approval of Title

We have pleasure in advising that your proposal entitled *Personality profile of anaesthetists in a Department of Anaesthesiology* 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 2: Ethics Approval

Human Research Ethics Committee (Medical)

Research Office Secretariat: Senate House Room SH 10005, 10th floor. Tel +27 (0)11-717-1252
Medical School Secretariat: PV Tobias Building Room 306, 3rd Floor. Tel +27 (0)11-717-2700
Private Bag 3, Wits 2050, www.wits.ac.za. Fax +27 (0)11-717-1265

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Office of the Deputy Vice-Chancellor Research & Post Graduate Affairs

MEMORANDUM

TO: **Dr Craig Segal**
Department of Anaesthesiology
E-mail: larus18@hotmail.com

FROM: **Mr Langutani Masingi**
Administrative Officer: Human Research Ethics Committee (Medical)
Tel: 011 717-1234/2656
E-mail: langutani.masingi@wits.ac.za

DATE: 26 August 2015

REF: ***R14/49***

PROTOCOL NO: M150716 *(This is your ethics application study reference number. Please quote this reference number in all correspondence relating to this study)*

The protocol below was considered at a meeting of the Human Research Ethics Committee (Medical) **on Friday 31 July 2015.** The Committee requires the following amendments/corrections/information from you before your application can be approved.

Project Title: Personality profile of Anaesthetists in a Department of Anaesthesiology.

Conditions: **Approved subject to:**

- Obtaining the signature of the Head of School since the Supervisor and the Research Coordinator is the same person.
- Reviewing the time it will take to conduct a questionnaire as 20 minutes is unlikely for 140 questions.
- Removing demographic information from the questionnaire as these are potential identifiers. It is recommended that the demographics are stored in a separated file which is linked to the questionnaire.
- Providing CEO's permission.

NB:

1. **Please submit a covering letter (list all the conditions above and write your response below the each condition and attach only documents referred to above) highlight any changes made and send two hard copies to this office. The default for submission is hardcopies –Amendments send by email will not be considered.**
2. **Amendments must be delivered at Faculty of Health Sciences, Phillip Tobias Building, second floor, Cnr York Road and Princess of Wales Terrance**
3. **Office hours: 08h30–17h00** *(Lunch 13h00-14h00)*

Appendix 4: Pearson Letter of permission for Figure 1.1

Permissions
200 OLD TAPPAN ROAD
OLD TAPPAN, NJ 07675
Fax: 201-767-5956
USAPermissions@pearson.com

Jun 10, 2015 PE Ref # 190767

Craig Segal
UNIVERSITY OF WITWATERSRAND
Faculty of the Health Sciences
Private Bag 3
WITS, 2050, SOUTH AFRICA

Dear Dr. Craig Segal,

You have our permission to include content from our text, ***PERSONALITY: CLASSIC THEORIES AND MODERN RESEARCH, 3rd Ed. by FRIEDMAN, HOWARD S.; SCHUSTACK, MIRIAM W.,*** in your masters thesis by coursework at UNIVERSITY OF WITWATERSRAND.

Content to be included is:
1 Table from Chapter 1 Timeline History of Personality Psychology

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Sincerely,
Vineta Lewis, Permissions Supervisor

Appendix 5: Permission Center of Well-Being

To Whom It May Concern:

I grant Craig Segal my permission to use the following tables from "TCI: A guide to its development and use" in his final report and in a journal publication in the SAJAA:

- Temperament and character descriptors
- Basic-Stimulus-Response Characteristics of traditional personality categories.

Sincerely,

Dr. C. Robert Cloninger

Section 5: Proposal

Personality profile of anaesthetists in a Department of Anaesthesiology

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MMED (Anaesthesiology)

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5.1 Introduction

Personality is defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as “Enduring patterns of perceiving, relating to, and thinking about the environment and oneself”. The DSM-IV continues to define personality traits as “prominent aspects of personality that are exhibited in relatively consistent ways across time and across situations. Personality traits influence self and interpersonal functioning”(40). Impairments in personality functioning and personality trait expression may reflect the presence of a personality disorder (41). Stereotypes of specialist doctors have developed over time, especially towards surgeons and psychiatrists, which may or may not hold true(42). Pervasive personality types have been found to be more prominent in groups of specialist doctors using different assessment tools (27, 30, 31, 42).

Personality has an important role on specialty choice, subsequent perceptions of stress and job satisfaction (43, 44). With respect to anaesthesia, personality typing has been included in research with various objectives such as recruitment, academic performance and error avoidance (28, 34, 35, 37, 38, 42, 43). Anaesthetists have been found to have a unique pattern of personality compared to other specialties and the general public (25, 30, 31).

Anaesthesiololgy as a profession is inherently stressful as there is always the potential for severe damage to or death of patients. Occupational stress is a “negatively perceived quality, which, as a result of inadequate coping with sources of stress, has a negative mental and physical ill health consequences” (45). In addition, doctors are described as obsessional, perfectionist and having high drive for achievement, which may predispose to occupational stress (46). Several studies suggest that there is a higher suicide rate among doctors. Suicide rates have been speculated to indicate high stress levels in a profession (47, 48). Anaesthetists are quoted as having a higher risk of suicide than the general population (49, 50).

As the study of personality is developing, similarly personality assessment tools have developed. Personality has traditionally been distinguished into two separate domains: temperament and character. Temperament involves individual differences in percept-based habits and skills. Temperament refers to the “automatic emotional responses to experience”(22). Character involves differences in concepts about one’s self in functional relation to parts of the whole field of experience which influence voluntary choices, intentions

and meaning of life experiences (22). These two parts of personality can be tested for separately and have different clinical application (21). The most common assessment tool with respect to anaesthetists has been Cattell's 16 Personality Factor Questionnaire (25, 30). This test is based on the Five Factor Model of personality. More recently the TCI has been investigated(31, 33, 44, 51). The TCI is based on a seven-factor model of personality. This model includes novelty seeking, harm avoidance, reward dependence, persistence, self-directedness, cooperativeness and self-transcendence. The TCI allows for differential diagnosis of personality disorder subtypes from one another and from other psychiatric disorders (15). The Short TCI is a shortened version of the full TCI. It is recommended for research where time availability is limited but lacks some of the detail of the full test (22). The short TCI has been shown to correlate highly with the full TCI counterparts (23).

5.2. Problem statement

Personality has an impact in various areas of an anaesthesiology department. Personality typing is not a routine assessment of anaesthetists at the University of Witwatersrand (Wits). More pertinent than simply the description of personality types is the potential use of personality testing to predict outcomes such as academic performance, work satisfaction, stress management or substance abuse (28, 29, 35, 38, 52). For managers, personality assessments allow them to better understand and be more effective in managing people (8). It is not known what personality profiles are among the anaesthetists in the Department of Anaesthesiology at Wits.

5.3. Aim

The aim of this study is to explore the personality profile of anaesthetists working in the Department of Anaesthesiology at Wits using the TCI-140 questionnaire.

5.4. Objectives

The primary objective of this study will be to describe the personality profile of anaesthetists in the Department of Anaesthesiology at Wits.

Secondary objectives will be:

- to describe the anaesthetists according to temperament-character configurations,
- to compare anaesthetists according gender,

- to compare anaesthetists according to age,
- to compare junior and senior anaesthetists.

5.5. Research assumptions

The following definitions will be used in this study.

Anaesthetist: qualified doctor working in the Department of Anaesthesiology including medical officers, registrars and anaesthesiologists who administer anaesthesia.

Medical Officer: a doctor employed by the provincial government in a designated medical officer post. A medical officer may have a diploma in anaesthesiology or no formal postgraduate certification. This doctor is registered by the Health Professionals Council of South Africa (HPCSA) for independent practice.

Career medical officer: medical officers with more than 10 years of experience in anaesthesia.

Registrar: a doctor who is in the process of acquiring a specialist qualification in anaesthesiology endorsed by the HPCSA or relevant governing body.

Anaesthesiologist: a doctor who has a postgraduate qualification endorsed by the HPCSA for anaesthesiology practice.

Junior anaesthetist: medical officers and registrars.

Senior anaesthetist: anaesthesiologists and career medical officers.

Temperament Character Inventory (TCI): According to the Center of Well-Being at the University of Washington (22), the TCI is "a set of tests designed to identify the intensity of and relationships between the seven basic personality dimensions of temperament and character, which interact to create the unique personality of an individual". The TCI measures seven higher order dimensions and 29 subscales. The TCI has had many versions. The latest is the TCI-R and consists of 240 questions on five-point Likert scales (22).

The short TCI: According to the Center of Well-Being, the short TCI is recommended for research. It measures the seven higher order dimensions but not all the subscales of the TCI. The short TCI consists of the 140 questions. The short TCI has had many versions. The latest is the TCI-140 which consists of the first 140 questions of the TCI-R (22).

Temperament-Character configuration: According to Cloninger and Svrakic (14) combinations of scores on the TCI "predispose individuals to qualitatively distinct patterns of emotional response". Personality disorders correspond to different configurations of scores.

5.6. Demarcation of study field

This study will be conducted in the Department of Anaesthesiology at Wits. There are five hospitals affiliated with the department: Charlotte Maxeke Johannesburg Academic Hospital, Chris Hani Baragwaneth Academic Hospital, Helen Joseph Hospital, Rahima Moosa Mother and Child Hospital and Wits Donald Gordon Medical Centre.

The Wits Department of Anaesthesiology currently consists of 85 consultants, 112 registrars, 21 medical officers.

5.7. Ethical considerations

Permission to conduct the study will be obtained from the Human Research Ethics Committee (Medical) and the Graduate Studies Committee of Wits.

Doctors will be invited to complete a self-reporting questionnaire (Appendix 1). The questionnaire will be accompanied by an information letter (Appendix 2). Completion of the questionnaire will be voluntary and completing the questionnaire will imply consent. Methods by which anonymity and confidentiality of participants will be ensured:

- questionnaires will contain no identifying data
- questionnaires will be returned in unlabelled, sealed envelopes provided with the questionnaire
- access to questionnaires will be restricted to the researcher and supervisors.

Information will be included in the information letter and the questionnaire that if a participant wishes to know their results after the analysis, they will have to present their questionnaire number in order to retrieve their results. This breach of anonymity will be explained to the participants.

Questionnaires will be stored securely for a period of six years after completion of the study.

If any participant feels the need for support after completion of the questionnaire, contact details for support and counselling services will be made available on the information letter.

This study will be performed in accordance with the Declaration of Helsinki (53) and the South African Good Clinical Practice Guidelines. (54)

5.8. Research methodology

5.8.1 Research design

This study is a descriptive, prospective, contextual study.

A descriptive study describes variables as they occur naturally or to answer a research question. Existing studies provide a theoretical framework for the study. Descriptive studies gather information about a chosen sample population (55). This study will describe the personality types in the Department of Anaesthesiology according to the TCI questionnaire.

In prospective studies data are collected first and outcomes are measured afterward (55). The data will be collected at the time that the research takes place and personalities will be defined after analysis of the questionnaires.

A contextual study, according to de Vos et al (56), is a study of a 'small scale world' such as a hospital. The researcher attempts to place the participants 'in context' and to understand them as a whole instead of as variables or disconnected from environment and outside influences (56). This study includes only anaesthetists in the Department of Anaesthesiology at Wits.

5.8.2 Study population

The study population consists of the anaesthetists working in the Department of Anaesthesiology.

5.8.3 Study sample

Sample method

A convenience sampling method will be used in this study. Convenience sampling is a type of non-probability or non-random sampling. It involves the choice of available participants who are "at the right place, at the right time" (55).

Sample size

A sample of 100 participants will be used due to financial constraints.

Inclusion and exclusion criteria

Inclusion criteria:

- anaesthetists working in the Department of Anaesthesiology,
- anaesthetists who consent to participate in the study.

Exclusion criteria:

- anaesthetists on annual, special or sick leave at time of data collection
- blank questionnaires.
- Incomplete questionnaires
- Intern doctors – not full time in the department of anaesthesiology; doctors not registered by HPCSA for independent practice.

5.8.4 Collection of data

TCI-140 questionnaire

The Center of Well-Being consented to the use of the TCI for this study (Appendix 4). The TCI is designed to identify seven basic personality dimensions which interact to create an individual's unique personality. They are: novelty seeking (NS), harm avoidance (HA), reward-dependence (RD), persistence (PS), self-directedness (SD), cooperativeness (CO) and self-transcendence (ST) (22). The TCI-140 (Appendix 1) is recommended for research where participants have limited time. The TCI-140 is a self-reported questionnaire consisting of 140 questions rather than 240 questions of the full TCI-R. The TCI-140 has been shown to correlate well with the seven major dimensions of the TCI-R (23).

The researcher will be required to complete an online training course prior to collection of data.

The TCI has been criticised for not adequately explaining its biological underpinnings (57). However, TCI was chosen as the instrument in this study because it has been shown to be valid across cultures, languages and psychiatric pathology (23). The TCI has been used in previous studies on anaesthetists internationally (31-33).

In addition to the questionnaire, the following demographic information (Appendix 3) will be requested: gender, age and position in department.

Collection of data

Questionnaires will be distributed at departmental meetings. Permission will be obtained from the organiser of the meeting to address the department in order to give an overview of the study and invite anaesthetists to take part. Questionnaires (Appendix 1) and the information letter (Appendix 2) will be handed out to those anaesthetists who consent to take part. Twenty minutes will be given to complete the questionnaires. Questionnaires will be returned in sealed unmarked envelopes and deposited into a sealed box marked "return questionnaire". Sealed boxes will be available in a secure but accessible area for those who wish not to complete their survey at the meetings. Instructions will be given that questionnaires should be returned to a box whether complete or not.

Questionnaires will be numbered so as to keep track of questionnaires completed, to prevent reproduction of results and to calculate response rate. Questionnaires contain no identifying personal information. If participants wish to know their results they will have to use the questionnaire number and in so doing break the anonymity of their results.

Questionnaires will be checked for completeness and collection will end when the target of number questionnaires is realised.

5.8.5 Data analysis

Raw answers from questionnaires will be captured into a Microsoft ® Excel spreadsheet by the investigator. Scoring of questionnaires will be done by the Center of Well-Being in the USA. Descriptive and inferential statistics will be used. Categorical variables will be described using frequencies and percentages. Continuous variables will be described using means and standard deviations or medians and interquartile ranges depending on the distribution of the data. Comparisons between categorical variables will be done with chi-squared or Fisher's exact tests. Comparisons between continuous variables will be done using t-tests or Mann-Whitney tests depending on the distribution of the data. Statistics will be done with the assistance of a biostatistician.

5.9. Significance of study

Personality assessments seek to quantify important individual characteristics of personality and develop accurate methods of measurement of characteristics (2). Knowledge of personality types in an occupational setting allows managers to better understand individuals

and be more effective managers (8). In anaesthesiology departments, personality types have been linked to academic performance, job satisfaction, stress and burnout (28, 39, 43). This study would give better insight into a department which has already been shown to have high levels of stress and burnout (50, 58).

5.10. Validity and reliability of the study

Botma et al (59) defines validity as whether "the conclusions of the study are justified based on the design and interpretation" of the study. The authors define reliability as "the consistency of the measure achieved".

In order to ensure validity and reliability of the study the following will be done:

- The TCI-140 has been validated by multiple studies (23, 60);
- the online training course through Center of Well-Being will be completed by researcher prior to data collection in order to give greater depth of knowledge into the TCI and personality assessment;
- the choice of appropriate study design - prospective, descriptive, contextual study;
- the anonymity and confidentiality of participants will be ensured in order to facilitate a non-threatening environment;
- the analysis of data will be done with assistance of a biostatistician.

5.11. Potential limitations of the study

This is a contextual study and the results of the study may not be generalisable to other populations or anaesthesiology communities.

The sample size is limited due to financial constraints and therefore may not be representative of the entire department.

This study is using a convenience sample method which may have sampling bias. This means generalisation to other groups may not be appropriate (55).

Participants can be dishonest or give socially acceptable answers.

5.12. Project outline

	Jun 2015	July 2015	Feb-Mar 2016	Apr 2016	May-June 2016	Sept 2016
Proposal, literature review, methodology, ethics and postgraduate proposal	X					
Ethics submission		X				
Postgrad committee submission		X				
Data collection			X			
Data analysis				X		
Writing of results and discussion					X	
Submission to faculty					X	
Corrections						X

5.13. Financial Plan

The Department of Anaesthesiology at Wits will bear the cost of printing and paper for the proposal, ethics and postgraduate approvals.

Additional funding will be sought from Jan Pretorius Fund.

Description	Price per item	Number of items	Total
Online Training	R2447.81 (US$ 200)	1	R2 447.81
TCI-140	R54.34 (US$ 5.22)	100	R5 434.20
Printing Proposal	R1 per page	400	R400.00
Printing demographics sheet	R1 per page	100	R100.00
Printing final report	R1 per page	600	R600.00
Binding report	R50	2	R100.00
Envelope	R1	100	R100.00
		Total	R9 182.01

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5.15. Appendices

Appendix 1: The Short Temperament and Character Inventory (TCI-140)

See additional file

Appendix 2: Information letter

Dear Colleague,

My name is Craig and I am an anaesthesiology registrar in the Department of Anaesthesiology at Wits University. I would like to invite you to participate in a research study titled, “Personality profile of anaesthetists in a Department of Anaesthesiology”. This study will be in partial fulfilment of my MMED degree.

The aim of the study is to explore the personality profile of anaesthetists working in the Department of Anaesthesiology at Wits. Personality impacts on many aspects of practice of anaesthesia including: work satisfaction, stress management, burnout and performance as a registrar. Personality profiles allow the managers of the department to better understand people and allow for more effective management interventions. A study of this kind has not been done in this department before. The personality assessment will be done using the Temperament and Character Inventory questionnaire.

Participation is voluntary and consent will be implied on completion of a questionnaire. The questionnaire should take approximately 30 minutes. No incentive will be provided for completion of the questionnaire. All information will be confidential and anonymity maintained as no personal information will be required to complete a questionnaire. Numbering of the questionnaires is for data capturing purposes. Results published will have no identifying data. All survey content will only be viewed by me and my supervisors. No penalty will be incurred for not participating in the study. Participants are free to withdraw from the study prior to handing back their questionnaires without having to provide a reason. Please place questionnaires in the envelope provided and into the box supplied whether complete or not.

If you wish to know your results, please take note of your questionnaire number. Be aware if you bring your number to find your results, this will breach the anonymity of your questionnaire.

This study has been approved by the Human Research Ethics Committee (Medical) and the Postgraduate Committee of the University of Wits.

Before completing this survey, please ensure you understand the above information. Your time is greatly appreciated.

Any questions regarding this study can be directed to myself Craig Segal (Tel: 082 451 7464) or the Chairman of HREC Prof. Cleaton-Jones (Tel: 011 717 1234).

After completing the questionnaire should you feel the need for counselling or wish to discuss any issues, please contact:

Independent Counselling and Advisory Services (ICAS)
Tel: 0800 777 780

Life Line: National counselling line: 0861 322 322 or 011 728 1347

Thank you

Craig Segal

Appendix 3: Demographics sheet

Please complete and tick the box of the most appropriate answer:

Gender	Male	☐
	Female	☐
Age	20 – 30 years	☐
	31 – 40 years	☐
	41 – 50 years	☐
	51 – 60 years	☐
	> 60 years	☐
Position	Consultant	☐
	Career Medical officer	☐
	Registrar	☐
	Medical officer	☐

Appendix 4: Email from Center of Well-Being

From: **alindavm@gmail.com** on behalf of **Anthropedia Foundation** (info@anthropedia.org)
Sent: 18 June 2015 10:13:18 PM
To: Craig Segal (larus18@hotmail.com)
Cc: Juan Scribante (Juan.Scribante@wits.ac.za)

Dear Craig,

I'm happy to let you know that Dr. Cloninger is willing to grant you access to the TCI prior to participating in the online training, with the understanding that you will take part in it when it becomes available.

He is interested in having a healthy South African sample for cross-cultural comparison, so he's wondering if there would be any way to get a sample of controls up to 500. We wouldn't charge you for the extra 350 tests. If you'd like to write Dr. Cloninger directly to discuss, you can reach him here: crcloninger44@gmail.com.

Please let me know how all of this sounds to you, and we will move forward from there.

Best regards,
Alinda